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FOREIGN MILITARY REVIEW

No 5, May 1988

USA: Developing a New Strategy

18010401a Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 5, May 88 (signed to press 5 May 88) pp 3-9

[Article by Lt Gen I. Perov]

[Text] The Soviet Union's peaceable foreign policy and its initiatives to prevent war, limit arms, eliminate nuclear weapons and create [sozdaniye] a nonnuclear and nonviolent world are bringing the West's militaristic forces face to face with the need to resort to new, increasingly complex maneuvers.

Against the background of positive changes occurring in the world, conservative forces in ruling circles of the United States and NATO bloc cannot give up the policy of hegemonism in international affairs and they seek new forms and methods for realizing the obsession with world domination. A report published in the United States in January 1988 entitled "American Strategy of 'Selective Deterrence'" reflected these aspirations. It was prepared by assignment of the U.S. National Security Council by a rather professional group of former state and military figures which included in particular H. Kissinger, Z. Brzezinski, F. Ikle, A. Goodpaster, J. Holloway and J. Vessey. At one time they not only were creators but also active conductors of American foreign and military power politics.

The report's authors assert that U.S. long-range strategy for the period up to the year 2010 should be based on the principle of "actively opposing the Soviet Union in all regions of the globe" and of "containing Soviet expansionism in any part of the world." Thus it is easy to note that based on such recommendations new U.S. strategy will represent a modernized version of the now existing American strategy of "direct confrontation," but this time on a more clear-cut global scale and, as we will see later, on a more aggressive, offensive note with reliance on military force and its use in a wide range of possible crisis situations.

U.S. reactionary circles maintain the position of the inevitability of military rivalry and confrontation in Soviet-American relationships and a spread of centers of world tension and regional conflicts. They continue to assert that in the nuclear age a "catastrophic clash" between the United States and Soviet Union is definitely possible, but its likelihood is considerably less than that of other forms of conflicts. Over the next 15-20 years the United States and its allies must be ready for the necessity of "repelling a Soviet attack." In this regard the report recommends that the United States and its allies have a long-range, integral, multioption strategy and that foreign policy be conducted and organizational development of the armed forces be carried out on its basis. According to the authors of the proposed strategy, the plans and means of implementing them must permit the United States to participate in military actions of the broadest spectrum from low intensity conflicts to all-out nuclear war. At the same time it is emphasized that in the future it is not always advisable to rely on nuclear weapons as a means of warfare inasmuch as their use leads to self-destruction. It is assumed, for example, that in the course of opposition of American and Soviet sides in the Persian Gulf there can be an engagement only with the use of conventional weapons, with nuclear weapons remaining in the background in a "back-up" role. We will note that the actual state of affairs of U.S. preparations for conducting nuclear wars even for the period up to the year 2010 indicates otherwise.

In working out a new strategy specialists proceed from the assumption that even in case a Soviet-American agreement is reached regarding a 50-percent reduction in strategic nuclear arsenals, by the late 1990's the American strategic triad will be represented by the very latest strategic systems—the MX and Midgetman ICBM's, "Ohio"-Class nuclear-powered missile submarines (each with 24 Trident II ballistic missiles), and modern B-1B and B-2 strategic bombers that are platforms for precision cruise missiles with a range over 4,000 km. These weapons of warfare will have the potential of a "disarming" first nuclear strike and high effectiveness in destroying greatly hardened point ground targets.

In developing [razrabatyvat] the new strategic concepts, U.S. militaristic circles continue to give great attention to the problem of further improving NATO's nuclear weapons. As noted in a January 1988 edition of the British weekly NEW STATESMAN, American General Galvin, the Supreme Allied Commander Europe, is trying to get appropriations from the U.S. Congress to create [sozdaniye] "a new nuclear arsenal for Europe with the objective of compensating for the firepower which will be lost as a result of implementation of the INF Treaty." By the mid-1990's the United States plans to accommodate 1,300 new nuclear cruise missiles on aircraft of tactical aviation of NATO countries in Western Europe and 380 Tomahawk nuclear cruise missiles aboard American surface combatants and nuclear-powered submarines deployed off the shores of Western Europe and in the Atlantic. The United States already has begun stationing new nuclear artillery projectiles in the FRG. In addition, the work of creating [sozdaniye] air-launched cruise missiles and new short-range ballistic missiles has progressed far in the United States and other NATO countries. By the mid-1990's some 700 air-launched cruise missile as well as the American aircraft carrying these missiles are to be deployed in Great Britain. They will have a radius of action comparable with the range of the 160 ground-launched cruise missiles which are to be removed from American bases in Great Britain. In addition, the British government is making no attempts to begin talks on an agreement which would block the deployment of new weapons and is doing everything to keep the FRG from responding

positively to the proposal of the USSR and GDR for a moratorium on the deployment of new kinds of arms in expectation of talks on a reduction both of nuclear and conventional arms as well as of armed forces in Europe.

A report by U.S. Secretary of Defense F. Carlucci sent to the Congress in January speaks of the need to continue modernizing NATO's tactical nuclear weapons, to improve conventional arms, and to actively use "Western technological superiority" for these purposes. The report also emphasizes that the United States is ready to continue using its strategic nuclear forces in bloc interests.

The authors of the new American strategy commented approvingly on plans of Great Britain and France for a further build-up of strategic nuclear potential, which in their opinion is "a contribution to common defense" of the West.

Statements quoted earlier on the problem of preventing the outbreak of nuclear wars are clearly contradictory: on the one hand there is naked rhetoric and on the other hand there are practical affairs aimed at a substantial and qualitative modernization of the U.S. and NATO nuclear arsenal in Europe and their high readiness to conduct nuclear wars even in the future.

The report emphasizes that the United States needs a strategic defense to "deter" a nuclear attack and ensure a safe reduction of offensive arms. No clarification is given as to what kind of defense is meant. Essentially it is a question of creating [sozdaniye] an ABM defense system with space-based elements, which is given priority in U.S. military programs, and of implementing plans for modernizing the NORAD system, which would permit detection and engagement of airborne targets including cruise missiles at a range of several thousand kilometers from U.S. territory.

By comparing provisions of the report on the new U.S. strategy in matters of nuclear wars and the practical steps being taken in this direction by U.S. and NATO militaristic circles it is possible to see that even in the future after the year 2000 the chief factor in a modernized American strategy (in the final account it is not important what it will be called) will remain the fact that it is essentially far from a question of "selective deterrence," but of creating [sozdat] American nuclear forces unsurpassed in effectiveness. A trend is clearly seen here toward an accelerated quantitative build-up of intermediate range sea-launched nuclear weapons which presently do not fall under any restrictions and reductions but which give the United States great advantages in creating [sozdaniye] a real threat from maritime sectors for any potential enemies.

Authors of the new U.S. strategy pay special attention to the need for comprehensive development [razvitiye] of conventional arms as well. In their opinion the leading direction should be a further development of long-range precision weapons which will permit "destroying targets more effectively and selectively to a great depth of enemy territory."

The WASHINGTON POST notes that according to a statement by A. Wohlstetter, cochairman of the authors' commission and director of the U.S. Pan Heuristics Western Research Center, an improvement in accuracy of engaging targets creates the possibility of a programmed launch (i.e., against preselected targets) of cruise missiles from long ranges (thousands of kilometers) and ensures their guaranteed hit with a deviation of no more than 10 m. The report points out that present technology permits achieving an accuracy of 1-3 m when engaging fixed targets "from any range."

Based on this, the yield of an explosion necessary for destroying specific targets can be substantially reduced. The report notes that even missiles based in silo launchers which previously could be guaranteed to be destroyed by a 100-kt nuclear weapon will be able to be knocked out by cruise missiles with nonnuclear warheads containing only around 450 kg of explosives.

In the opinion of the report's authors, increased capabilities in the accuracy of engaging targets at a great depth by conventional weapons assures the United States of a minimum reduction in its military power even with a 50-percent reduction in strategic arms.

The report places substantial emphasis on preparation of offensive operations including "nonnuclear counteroffensive operations with penetration into the interior of enemy territory." It directly states that "NATO ground forces should provide in their plans for the possibility of conducting counteroffensive operations with the crossing of state borders between countries of the North Atlantic Alliance and Warsaw Pact."

American specialists place considerable emphasis on mass employment of long-range precision cruise missiles capable of delivering effective strikes against ground targets located at a considerable depth (several thousands of kilometers) on the territory of socialist states as well as other potential enemies of the United States. An essential advantage of such weapons, and of future weapons above all, is the possibility of their launches from platforms outside the coverage of the enemy's active air defense weapons, as well as the difficulty of detecting cruise missiles by radar in view of their flight at low altitudes and their low radar reflectivity thanks to the use of "stealth" technology in the missiles' design.

In connection with this the report emphasizes that if we wish modern weapon systems employed from zones outside the range of enemy air defense weapons to play a deciding role in combat operations between NATO and Warsaw Pact armed forces, their number in NATO forces must be considerably greater than what we now are planning to acquire. At the same time these modern

kinds of weapons will replace many hundreds of thousands of conventional bombs which we would need if the former were absent. The following is more important: the cumulative effect of these changes led to a situation where today one or a few precision weapons are sufficient when previously it was necessary to expend thousands of conventional weapons or several nuclear weapons.

In proposing a new strategy for U.S. opposition to the Soviet Union its creators proceed from the obvious truth—in the nuclear age any conventional war into which the USSR and United States might be drawn can develop into a nuclear war. They emphasize that this is why war must be planned and conducted without fail with consideration of the nuclear threat. This requires a further improvement both of nuclear and conventional NATO weapons.

Even if NATO will be able to make a decisive spurt in improving conventional kinds of weapons, the report notes, "it will continue to be necessary to have nuclear weapons (including those deployed in Europe)." They can be employed selectively for strikes, for example, against command posts or troop concentrations.

The report emphasizes that NATO's capability to wage war employing not only conventional weapons, but also nuclear weapons can be strengthened by using new technologies permitting an improvement in weapon accuracy and control system effectiveness.

Special emphasis is placed on development [razvitiye] of U.S. space weapons of various types including antisatellite weapons. The report notes that "during a war against the Soviet Union we will not have to rely on outer space remaining inviolable; most likely it will become a battlefield." In order to achieve U.S. domination in space it is deemed necessary in particular to ensure the possibility of knocking out enemy spacecraft at all altitudes in wartime and delivering strikes against ground facilities of his space systems using conventional weapons.

According to the forecasts of the report's authors, the basis for implementing plans of building up American military might will be the fact that for the period up to the year 2010 as well the United States will remain the leading world power in volume of gross national product, greatly outstripping all other developed world states. This will permit the United States to constantly increase military expenditures proportionate to the economy's growth.

The new American strategy devotes much attention to substantiating the need for U.S. military presence in various regions of the world even in the long term as well as retaining American military facilities on foreign territories for purposes of "protecting common interests outside the limits of national borders and borders of the NATO bloc" for "timely reaction to threats." Key regions for the United States are the Near East, Persian Gulf zone, Far East and Central America.

In recent years the Pentagon performed a vast amount of work to improve the military infrastructure in countries adjoining the Persian Gulf "in case large-scale combat operations are conducted there." The CHRISTIAN SCIENCE MONITOR notes that in Oman the United States is actively using military bases on the island of Masirah, in Muscat (Seeb), and Markaz Thamarid; hundreds of millions of dollars were spent on their modernization. A major naval base is situated in Bahrein (Manama), where American naval ships, including the command ship of the U.S. Navy Middle East Command, constantly call. In Somalia the Pentagon is using the bases of Berbera and Mogadishu, where $54 million were spent on reoutfitting them. In Kenya the Americans gained access to the port of Mombasa and to airfields in Nanyuki and Nairobi.

The Pentagon's principal base in the Indian Ocean is the military base on the island of Diego Garcia on which $1.1 billion already has been spent for modernization, with plans for spending at least another $300 million. A group of special weapon and military equipment depot ships, the stores of which are sufficient for supplying a Marine expeditionary brigade, is based here. The base also is actively used by American strategic aircraft making systematic flights in the Arabian Sea and Indian Ocean.

The foreign press notes that in addition to these military facilities in the area of the Persian Gulf and Indian Ocean, the Pentagon uses air bases in Morocco and Portugal on which over $100 million has been spent for reconstruction. It is planned to activate these bases during movements of the Rapid Deployment Force from U.S. territory to the Near East and the Persian Gulf zone.

An important place in the new strategy also is given to the Far East. The report emphasizes that American military presence in Japan and South Korea serves the cause of preventing possible "complications" such as a Soviet (or Chinese) invasion or use of nuclear weapons. This presence must continue for the purpose of a prompt reaction to "threats" in the Western Pacific. Specialists believe that it is necessary to shift a considerable part of the American military expenditures and vast obligations to U.S. allies and partners. A special role in this is given to Japan. Former U.S. Secretary of the Navy J. Webb declared: "Both Japan's resources and national interests permit her to assume a large share of defense in Asia." According to him, he proposed long ago that "Japan include in its constitution an interpretation of self-defense as well as security of sea lanes right up to the Indian Ocean."

That view of the American secretary also agrees with basic principles of Japan's so-called "Pacific doctrine"—establishment of a leading position in the Asiatic-Pacific

region and attainment of military-strategic goals, which are being carried out under the appearance of expanding economic assistance to countries of this region and ensuring political stability. The Japanese military-political leadership uses the intensifying "Soviet military threat" to substantiate the course toward establishing its dominance. For example, speaking at a briefing for foreign journalists in January 1988, N. Tanaka, a representative of the Japanese Ministry of Foreign Affairs, declared without substantiation that despite statements of an intention to develop economic cooperation and expand political contacts with countries of the South Pacific, the Soviet Union was attempting to achieve its military-strategic goals in the region.

Authors of the report are more specific with respect to Japan's role: "In the next decades the key question affecting the strategic balance of forces will be: To what extent will Japan succeed in taking advantage of its chances for developing into a major military power?"

These recommendations and wishes coincide with plans of the Japanese military-political leadership. The foreign press notes that, speaking in Parliament in January of this year, T. Kawara, head of the Japan Defense Agency, announced a five-year program being developed for building up the country's military power in which primary attention would be given to strengthening the northern grouping of forces, deploying over-the-horizon radars and AWACS aircraft, equipping ships with the Aegis multifunction weapon system, and developing [razrabotka] and producing new kinds of weapons and military equipment based on advanced technology.

On the whole the idea of the report with respect to using the principal American allies is not new and reduces to the fact that "the threat to the United States must be repelled not at its borders, but at the borders of our enemies," for which "in the future U.S. allies should share with it all concerns and expenditures connected with providing a mutual defense on an enormously larger scale than over the past four decades."

The report places considerable emphasis on conflicts in the "third world," which are examined from the standpoint of protecting U.S. interests. Almost all armed conflicts over the last 40 years, the authors note, occurred in countries of Asia, the Near East, Africa, and Central and South America. It is also emphasized that during this same period all wars in which the United States was "involved," either directly with its Armed Forces or indirectly through military assistance, occurred in the "third world."

The report emphasizes that, considering trends in dissemination of advanced technology and a growth of military might of third world countries, the United States clearly needs an understanding of its own interests, including military interests, in those regions. The conclusion drawn based on this is that in the next decades the United States will be required to be more prepared "to deal with conflicts in the third world" regardless of whether or not the Soviet Union is a party to them. Since the reliability of its allies, including NATO allies, is being reduced the United States should give third world states more substantial military assistance and covert support.

In the opinion of the report's authors, all these circumstances require the American leadership to regard low intensity conflicts not just as a problem concerning only the Department of Defense, but as more all-encompassing. In many situations along with troops the United States will be required to involve diplomats, bankers, economists and so on in order to resolve such conflicts.

In the opinion of the report's authors, to accomplish these tasks, i.e., for U.S. intervention in the affairs of third world states, it is necessary to have a special fund amounting to four percent of the Pentagon budget. In short, it is a question of U.S. capability to provide large-scale military assistance to reactionary and pro-American regimes in case of a threat that they will be overthrown, as well as readiness to use armed forces.

Concerning future low intensity conflicts in the third world, the authors of the new American strategy offer a number of recommendations, the principal ones being the following.

1. As a rule the U.S. Armed Forces should not take a direct part in combat operations and their possible use "should be considered an exception." But it is emphasized here that like the 1983 invasion of Grenada or the 1986 air strike against Libya, operations of the American Armed Forces also can occur in the future since otherwise "it would be defeatism for the United States to accept the concept of 'nonuse of its forces in the third world'."

2. The United States must support anticommunist rebel movements (this means military and other assistance to counterrevolutionary forces acting to overthrow legitimate governments). Covert or special operations and covert military assistance are very convenient and permit the U.S. government "to maintain official silence."

3. Increase programs (for delivery) of modern American weapons to third world states allied with the United States.

The authors believe that in all instances of crisis situations in third world countries U.S. naval forces and conventional long-range precision weapon systems on seaborne platforms can be the most mobile and effective. "With the Navy's presence in international or territorial waters of allies, but still beyond the limits of visibility, our operations at sea can be conducted more safely. . . . We probably also should not miss the opportunity here to employ precision missiles which can deliver strikes against strictly specific targets."

With regard to the problem of ridding mankind of weapons of mass destruction, the authors attempt to impose their opinion that even in the foreseeable future it is unrealistic to set the goal of achieving an agreement on eliminating all kinds of nuclear or chemical weapons.

And so a brief survey of a number of key provisions of the new strategy being developed in the United States for 1990-2010 indicates that its basis continues to be a military-political course toward total opposition to the Soviet Union in all areas, only on a more clear-cut, aggressive, offensive basis.

As noted in the January 1988 edition of the bulletin NOUVEL ATLANTIQUE, "the new, more offensive, mobile and global strategy of the United States looming on the horizon" is giving rise to alarm in Western Europe.

In contrast both to the presently existing and the evolving American strategy, the military doctrine of the Soviet Union and Warsaw Pact Organization bears a defensive character. It clearly reflects the new political thinking on questions of war and peace in the nuclear age and on problems of defense and equal security for all states.

"Guided by its defensive doctrine," declared USSR Minister of Defense Army Gen D. T. Yazov, "the USSR is building the Armed Forces based on the principle of sufficiency for defense. Sufficiency for strategic nuclear forces today is determined by the capability of preventing an unpunished nuclear attack on our country in any situation, even the most unfavorable one. For conventional arms sufficiency provides for the **minimum** necessary quantity and high quality of Armed Forces and arms capable of providing reliable national defense. The limits of defense sufficiency also are determined by actions of the United States and NATO. Of course the Soviet Union is not striving for military superiority and lays no claims to greater security, but it also will not accept lesser security and will not allow military superiority over itself. We do not intend to compete with the West in creating [sozdaniye] specific kinds of weapons and are taking those steps which assure security of the Soviet state and its allies.

"Based on principles of sufficiency, the USSR is bending efforts to decisively lower the level of opposition and reduce military potentials so that the West and East are left only with the personnel and equipment necessary for defense. But this has to be with respect to everyone."

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Nonnuclear Zones: Important Factor of European Security

18010401b Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
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[Article by Col V. Alekseyev, candidate of military sciences]

[Text] A nonnuclear zone, according to the definition accepted in international legal practice, is a territory free of tests, production, stationing, storage and transit of nuclear weapons as well as territory within which and against which the use of nuclear weapons is excluded. Hence it follows that nonnuclear states parties to the zone pledge not to produce, acquire or allow stationing of nuclear weapons on their territories and nuclear states pledge not to disturb the nonnuclear status of countries included in the zone and reject the use and threat of use of nuclear weapons against them. In order for nonnuclear zones to be such in fact, agreements on them must provide for effective, complete and reliable verification of compliance with the obligations undertaken.

A majority of UN member states constantly come out in favor of forming nonnuclear zones, and they regularly adopt corresponding resolutions at annual General Assembly sessions. The movement for such zones now has a solid international legal basis and takes in all regions of the world. Thus the fact of 23 Latin American countries belonging to a nonnuclear zone is formalized in the 1967 Treaty for Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty). The movement for creating a nonnuclear zone in the South Pacific led to practical results. In August 1985 a session of the South Pacific Forum decided to form such a zone (the Rarotonga Treaty).

Projects for creating zones free of nuclear weapons in Southeast Asia, on the Korean Peninsula and in the South Pacific remain far from realization (chiefly due to opposition of the United States and its allies). The principal obstacle in the Near East to implementing the idea of a nonnuclear zone is Israel's position. In Africa plans for creating such a zone did not reach the stage of practical realization chiefly because of the policy of the Republic of South Africa, its desire to possess nuclear weapons, and the cooperation of a number of western powers with this state in the nuclear area.

The idea of nonnuclear territories on the European continent has its history. Back in 1956 the Soviet Union proposed to create such a zone in Central Europe, in 1959 it proposed one in the Balkans, and in 1963 it proposed to declare the entire region of the Mediterranean a zone free of nuclear weapons. But each time these plans remained unrealized by virtue of the negative position of NATO countries, and the United States above all, which saw them as a threat to their power politics.

The Communique of a conference of the Political Consultative Committee of Warsaw Pact member states adopted in Berlin in May 1987 emphasized: "Warsaw Pact member states attach great significance to steps to relax military confrontation and strengthen security in individual regions of Europe, and to the creation of zones free of nuclear and chemical weapons in the Balkans and in the central and northern part of the continent. They affirm their resolve to achieve realization of proposals on this score advanced by the GDR and CSSR, Socialist Republic of Romania and People's Republic of Bulgaria.

"With respect to proposals of the GDR and CSSR for a nonnuclear corridor 300 km wide along the line of contact of the Warsaw Pact Organization and NATO (150 km in each direction), all nuclear weapons—nuclear munitions including mines, operational-tactical and tactical missiles, atomic artillery, airborne platforms of tactical strike aviation as well as surface-to-air missile systems capable of employing nuclear weapons—would be removed from it on a mutual basis."

Northern Europe is de facto a nonnuclear zone. All countries of this region—Norway, Denmark, Iceland, Sweden and Finland—have undertaken not to create [sozdavat] nuclear weapons under the Nonproliferation Treaty. Norway, Denmark and Iceland (NATO members) additionally pledged not to station nuclear weapons on their territories in peacetime. Foreign observers consider this an important but half-way decision. The fact is that NATO partners consider the prospect of nonstationing of nuclear weapons in these countries in case of military crises unacceptable. This is why the bloc leadership is trying to draw the states included in the North Atlantic Alliance into its nuclear strategy, which in reality contradicts the nonnuclear status of Norway, Denmark and Iceland.

It is no secret that Norway takes part in NATO's nuclear planning and establishment of the bloc's infrastructure including for the use of nuclear weapons, according to foreign specialists' assessments. No fewer than 20 Norwegian airfields are being used by air forces of NATO countries in peacetime. An agreement on unhindered landing of U.S. aircraft capable of carrying nuclear weapons has been concluded in case of a "crisis situation." American submarines with nuclear weapons aboard freely enter Norwegian naval bases. Under Washington's pressure the Norwegian government signed an agreement in 1980 on stockpiling American heavy armaments and various military gear on its territory.

NATO strategists set aside a key role for Denmark in plans to seal off the Baltic Strait zone linking Continental Europe with Scandinavia. In case of a military crisis it is planned to move up to 40,000 servicemen and at least 200 combat aircraft here from the United States and Great Britain.

Keflavik, on the territory of Iceland, has Europe's largest base where over 3,000 American servicemen and F-15 aircraft are stationed. In the assessment of western experts, there also can be nuclear weapon stores there. In any case they are there for certain during the transit of troops and military cargoes by the American Air Force and Navy. It is common knowledge that the official U.S. position on this score is not to confirm or deny the presence of nuclear weapons at its military installations. This means that Iceland, Denmark and Norway cannot give guarantees that their territories are not used for the transit of nuclear weapons even in peacetime.

Western specialists assess the strategic significance of Northern Europe highly: in this region it is planned to win a "decisive victory" in antisubmarine warfare and "shut up" the Soviet Navy in seas washing Scandinavia. It is not for nothing that some bloc leaders believe that if a war in Europe is not won on the northern flank it will be lost entirely. Such lines are made the basis of further integration of countries in NATO's nuclear infrastructure. Militarization of this part of the world is assuming a threatening character. One cannot help but be alarmed by reports that in attempting to get around the INF Treaty the North Atlantic Alliance is seeking methods of "compensating" for the loss of Pershings and ground-launched cruise missiles specifically on the northern axis by deploying sea-launched and air-launched cruise missiles in the North Atlantic, which signifies an additional threat to all countries of the region. Military activeness of the United States and NATO is increasing in areas immediately adjoining the Soviet Arctic.

In this situation the nonnuclear status of this region's countries can be lost even in peacetime. This is why the peoples of Northern Europe are striving more and more persistently for international legal formalization of their not yet guaranteed nonnuclear status. In fully sharing these anxieties, the Soviet Union has repeatedly declared that it is ready to pledge not to employ nuclear weapons and not threaten their use against states of Northern Europe which will become parties to a nonnuclear zone, i.e., reject the production, acquisition and stationing of weapons on their territories. Such a guarantee could be formalized by concluding an agreement between the USSR and each of the countries parties to the zone or on a multilateral basis. Comrade M. S. Gorbachev emphasized in his speech in Murmansk in October 1987: "We could go rather far, and particularly remove submarines armed with ballistic missiles from the Soviet Baltic Fleet."

It is common knowledge that previously the Soviet Union dismantled intermediate-range missile launchers on the Kola Peninsula and a large number of launchers for such missiles on the remaining territory of Leningrad and Baltic military districts on a unilateral basis as a good will gesture. Many operational-tactical missiles were redeployed out of these districts. The conduct of military exercises is restricted in areas near the borders of Scandinavian countries. Moreover, the Soviet Union

proposes to begin consultations between the Warsaw Pact Organization and NATO on a reduction in military activities and a limitation on the scale of activity of navies and air forces in water areas of the Baltic, North, Norwegian and Greenland seas as well as the extension of confidence-building measures to them. Social-democratic and communist parties and many trade union, public and political figures of countries of Northern Europe are speaking out in favor of the urgent establishment of a nonnuclear zone here. Their motto is: "A nonnuclear zone today, tomorrow will be too late."

But the U.S. position with respect to nonnuclear zones, including in Northern Europe, bears a sharply negative character. Western propaganda tirelessly repeats over and over again that this is a "dangerous illusion," "false security," that only NATO is capable of assuring the security of this region against the "threat from the East."

The idea of creating nonnuclear zones enjoys broad support in the **Balkans** and in many Mediterranean countries. At meetings representatives of governments of Greece, Bulgaria, Yugoslavia and Romania have repeatedly declared the urgent practical need for implementing this idea. A nonnuclear zone could neutralize the danger that a center of military and political tension might arise between East and West over continuing U.S. nuclear preparations on the bloc's southern flank in the area where armed forces of NATO and the Warsaw Pact Organization come in contact. We will note that the Pentagon already has an entire network of its air and naval bases there and other military installations in Italy, Turkey, Greece and Spain which service submarines, aircraft carriers, and aircraft of tactical and strategic aviation armed with nuclear weapons.

Establishment of a nonnuclear zone in the Balkans could contribute to a growth of mutual confidence of states of this region and implementation of the idea of transforming the Mediterranean into a zone of peace and cooperation. The Soviet Union repeatedly stated that it favors the removal of warships carrying nuclear weapons from the Mediterranean, renunciation of the stationing of nuclear weapons on the territories of nonnuclear Mediterranean countries, and pledges by nuclear powers not to employ nuclear weapons against any Mediterranean country. During a visit to Yugoslavia in March 1988 Comrade M. S. Gorbachev said: "It has been repeatedly stated on our part, and I would like to confirm, that the Soviet Union is wholly for developing cooperation in the Balkans. We support the latest initiatives of Bulgaria, Romania, Yugoslavia and Greece aimed at lowering military activeness here; we favor the removal of all foreign troops and military bases from the Peninsula; and we will give all necessary guarantees should it be decided to establish a zone free of nuclear and chemical weapons in the Balkans."

Nevertheless, U.S. militaristic circles are taking vigorous actions with the aim of placing a moratorium on the process of forward progress of the project for establishing a nonnuclear zone in the Balkans, assuming that a course toward aggravation of international relations in Europe will have a "disciplining" effect on NATO allies. But this course demonstrates a boomerang effect—the more nuclear weapons stationed on the European continent, the stronger the desire to avoid the fate of "nuclear hostages" which Washington has prepared for its NATO partners.

It is common knowledge that **Central Europe**, where major groupings of NATO and Warsaw Pact armed forces are in contact, holds a special place in the matter of strengthening peace and stability on the continent. It is here in the most densely populated region of Europe that the arsenal of arms (including nuclear weapons) largest in devastating force is located. Its presence causes fear not only in supporters of disarmament, but also in far-sighted politicians and some military figures in the West. The real threat that tactical nuclear weapons (attack aircraft, missiles, nuclear artillery) can be put to use in an early stage of an armed conflict exists, and any crossing of the "nuclear threshold" is fraught with the prospect of escalation in use of these weapons. We will note that even after elimination of American intermediate and lesser range missiles the U.S. nuclear arsenal in Europe will include at least 4,000 nuclear devices for aerial bombs, warheads, and heavy-caliber artillery projectiles. We will add to this around 400 nuclear weapons of Great Britain and France.

And although some in the West try to assert that the very mechanism of setting in motion "battlefield" nuclear weapons allegedly strengthens the "deterrence" policy and consequently strengthens security, in fact tactical nuclear weapons were transformed long ago into one of the principal weapons of warfare and a material basis for argumentation over the possibility and expediency of conducting a "limited" nuclear war. Thus the high likelihood of a clash of West and East in Central Europe objectively predetermines the need for establishing a unique nonnuclear corridor here.

The foreign policy initiative which the Polish People's Republic advanced in May 1987 and which is a component part of the pan-European process begun in Helsinki is of fundamentally great importance in this regard. A feature of the conceptual approach of the Polish People's Republic and of practical steps of its diplomacy is that in seeking a solution to complex problems it places emphasis on achieving partial agreements on a regional basis which can and must become the catalyst of a universal process. Its proposals are widely known: about freeing Central Europe of nuclear weapons, as set forth in the "Rapacki Plan" (1957), as well as for freezing nuclear arms on territories of the Polish People's Republic, CSSR, GDR and FRG, as set forth in the "Gomulka Plan" (1963). They were not implemented exclusively through the fault of western powers.

The new Polish initiative, called the "Jaruzelski Plan," is a comprehensive plan for reducing arms and armed

forces and building confidence in Central Europe, the first step along the path of establishing nonnuclear zones on the continent.

Why does this plan involve a limitation both of nuclear and conventional arms? Nuclear weapons and operational-tactical missiles with conventional filling (radius of action around 500 km) predominate in the quantitative sense in military potentials stockpiled in this zone. A simultaneous reduction of both nuclear and conventional potentials is explained by the fact that to a considerable extent one and the same means can be used dually, i.e., for delivering an attack by conventional and nuclear weapons. The Polish People's Republic proposed such steps on condition that they create guarantees of equal security of parties in Central Europe. This idea should dispel the fears of some western states concerning preservation of unbalanced conventional potentials after the possible elimination of nuclear weapons. It is important that the most powerful conventional weapons also be eliminated simultaneously with elimination of nuclear weapons. That decision correspondingly reduces the capability of the sides for offensive actions, thus strengthening states' mutual feeling of confidence and security.

As M. S. Gorbachev noted in the article "Reality and Guarantees of a Safe World," this idea is the initial project for a possible new arrangement of life in our common planetary home. In other words, it is a pass to the future, where the security of all is a guarantee of the security of each one.

6904

U.S. Work to Create Artificial Intelligence Equipment for Military Purposes

18010401c Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 13-16

[Article by Col M. Mikhov]

[Text] In striving for U.S. military superiority in the world arena, American militaristic circles are trying to use for this purpose among other means the latest achievements of cybernetics, modern computer equipment, and sophisticated systems for automation of control processes. For example, in recent years the term "artificial intelligence" has begun to be used in the lexicon of Pentagon leaders and in the pages of the American military press. This term is used to proclaim the possibility of raising the technical outfitting of the U.S. Armed Forces to a qualitatively new level. Descriptions of futuristic walking, swimming and flying combat robots which detect and engage targets without human participation have appeared in specialized journals. Successes in implementing the "star wars" program are linked with the new capabilities of automatic machines for decisionmaking in a difficult situation. It should be noted that behind the curtain of the latest "boom"—this time a military computer boom—lie both real achievements of American specialists in the sphere of automating warfare processes as well as ambitious plans of the military-industrial complex, which is attempting to extract fabulous profits from this.

It is common knowledge that "artificial intelligence" is not a new term in world science. It is understood to mean realization of the latest achievements of information science and capabilities of computer technology as well as software for simulating thought processes of the human brain. American military specialists commonly include in this area the new-generation computers, verbal interaction between man and computer, and "intelligent" robots, "machine" vision, and expert systems. But before becoming a subject of military developments [razrabotka], the problem of creating [sozdaniye] artificial intelligence covered almost a 25 year development [razvitiye] path within the framework of basic interdiscipline research using achievements of mathematics, logic, psychology, linguistics and other sciences.

The term "artificial intelligence" was popularized in the United States in 1956 by Massachusetts Institute of Technology Professor J. McCarthy at a meeting at Dartmouth College (New Hampshire) of prominent American specialists in the sphere of sciences connected with the theory and practice of the study of computer processes. At this meeting, which people in the United States call the first artificial intelligence conference, two principal tasks were posed in a new S&T area—revealing the human thought mechanism and building an electronic machine which could simulate this process.

In the 1960's questions of artificial intelligence were being worked on by well-known science centers in the United States, with the Massachusetts Institute of Technology, Carnegie-Mellon University, and Stanford University taking the lead. New constructive ideas were advanced in this period for simulating human thought processes, and the first expert systems were also developed [razrabotat], which even now are a sphere of broad practical use of artificial intelligence equipment. A number of problems connected with solution of informal-logic and heuristic problems by machine resources and with processing of symbolic data customarily are included in the sphere of artificial intelligence at the present time. Such problems are the interaction of man and computer in a natural language, automatic translation of text from one natural national language to another, recognition of visual images, creation [sozdaniye] of adaptive self-programming robots, and others. But the aforementioned expert systems remain the basis for perfecting artificial intelligence equipment, since it is within their framework that priority fundamental problems are resolved—organization of human knowledge for input to a machine and development [razvitiye] of special software for manipulating this knowledge.

The press reports that an expert system is an information-reference device created [sozdat] on the basis of computers which is used in a certain field of human endeavor. It contains appropriately organized knowledge of the most qualified expert specialists and produces recommendations on actions in the situation at hand for the operator. In contrast to conventional information retrieval systems, the expert system provides an explanation of the recommendations produced and suggests alternative solutions in the course of a dialogue with the operator. The dialogue is conducted in the professional language of the operator specialist close to natural language without participation of a programmer.

The principal problem in realizing expert systems is to create [sozdaniye] a new type of software which includes two basic subsystems—a knowledge base and a mechanism for forming logical conclusions.

Creation [sozdaniye] of the knowledge base subsystem is the key task of new software for representing informal human experience in a formalized form. It determines the structure of the expert system. The transition from the data base of existing information systems to knowledge bases of future automated systems represents one of the basic problems in creating [sozdaniye] future artificial intelligence equipment.

American scientists have developed [razrabotat] a number of forms for representing knowledge, particularly in the form of frames (formal structures for representing stereotyped situations), products (logical constructions according to rules such as "if..., then..."), semantic networks (formal knowledge represented in the form of graphs with relationships laid out), scripts (a statistical description of the time sequence of phenomena) and so on. The mechanism of forming logical conclusions includes software for modeling the process of producing decisions, substantiating the decisions produced, and carrying on a dialogue with the operator. Answers are given to the questions of a decisionmaking human based on the knowledge base and using data on the status of the area being analyzed coming from data input devices independent of the operator. This mechanism also provides for use of means for eliminating incompleteness, contradictoriness and impreciseness of expert data.

One of the first expert systems was the Dendral system developed [razrabotat] at Stanford University in 1965, which permits building three-dimensional structures of organic molecules based on their chemical formulas and mass spectrograms.

Being essentially a program for a computer, the expert system can function on the basis both of a general-purpose computer as well as a specially created [sozdat] computer. Such systems usually are developed [razrabatyvatsya] and written on high-capacity general-purpose computers or on computer systems specially built for this purpose (building tools), and then relayed for input to the appropriate computer or the user's specialized digital system.

From the beginning of the appearance of expert systems up to the present time, a high level language, LISP, developed [razrabotat] in the late 1950's by J. McCarthy, has been widely used in the United States for writing them. Being in the class of superhigh level languages, LISP is oriented toward consolidated fragments of data (lists) and, having significant capabilities for processing symbolic data, was fully suitable for expert systems.

The base of artificial intelligence facilities considerably expanded in the 1970's; studies in the area of image recognition, speech analysis and synthesis, and adaptive robot technology received new impetus and supercomputers were created [sozdat] which met the capabilities of expert systems in their speed. Several tens of expert systems were developed [razrabotat] at this same time intended in particular for medical diagnosis, for forecasting geological structures, for troubleshooting in sophisticated technical systems and so on.

In 1971 the U.S. Department of Defense and above all the Defense Advanced Research Projects Agency (DARPA) joined in the research; DARPA developed [razrabotat] a number of programs in areas of speech recognition and visual data processing. By this time PROLOG, a second logical programming language, began to be used and a family of computers was created [sozdat] with an architecture adapted for using the LISP language—so-called "LISP-computers."

In the 1980's the U.S. military department considerably stepped up research in the field of artificial intelligence by opening up a large-scale program for development [razvitiye] of computer technology, the "strategic computer program." Begun in 1984 seemingly as an answer to a Japanese program promulgated in 1981 for creating [sozdaniye] fifth-generation computers, the strategic computer program was oriented toward developing [razrabotka] (by the late 1980's) data processing hardware considerably exceeding the Kray-X/MP" supercomputer in speed, and toward building artificial intelligence systems with practical application in military command and control over the next decade on its basis. Planned expenditures for the five years of this program were $600 million, which gave research in the artificial intelligence field a clear-cut militaristic character. The American press also emphasized that National Science Foundation appropriations for these purposes were planned in the period in question at the level of six million dollars per year.

Although the strategic computer program controlled by the Pentagon (DARPA) is characterized by a general military conceptual direction, a number of specific programs in the artificial intelligence field are being developed [razrabatyvatsya] only in the interests of individual branches of the Armed Forces. These include, for example, the Navy's combat operations control center, a pilot's electronic assistant (for the Air Force), and an Army autonomous ground transporter. At the basis of each of the developments [razrabotka] is the creation

[sozdaniye] of corresponding expert systems and logical programming resources. While the combat operations control center is an expert system in the purest form, the pilot's electronic assistant is the very same system, but supplemented by means of speech interaction with a human and graphic visualization. In creating [sozdaniye] a ground transporter as a prototype of combat robots of the future, specialists must rely (as in the case of expert systems) on use of knowledge bases and mechanisms for forming logical conclusions for orienting the vehicle among obstacles in the immediate vicinity as well as for choosing the optimum route on the terrain.

As shown by American specialists' assessment of progress in fulfilling the program, despite a significant leap in computer productivity (multiprocessor systems with parallel processing raised the speed of computers by one or two orders of magnitude), difficulties in developing [razvitiye] logical programming resources will not permit creating [sozdat] such qualitatively new means of automating warfare as autonomous combat robots in the next few years. In addition, a number of experts believe that in case of accelerated realization of the "star wars" program it should not be tied in with the program for developing [razvitiye] artificial intelligence equipment. In their opinion, control systems based on knowledge bases and functioning in real time of a combat situation cannot be realized by a simple build-up of computational capacities of computers without substantial progress in developing [razrabotka] logical programming resources.

The most objective assessments indicate that prototypes of expert systems of a supporting nature—for troubleshooting in sophisticated systems and machine units, planning logistical support of operations, automatically interpreting visual images, and simulating a combat situation in conducting command and staff games—will be created [sozdat] by the early 1990's. Creation [sozdaniye] of an automated system for control of communications and data distribution in the long-range target acquisition and weapon control system being developed [razrabatyvat] within the framework of SDI is considered relatively realistic.

In the conclusion of foreign specialists, U.S. Defense Department research in artificial intelligence is broadening and already is producing practical results. In particular, a prototype of a combat operations control system installed at U.S. Navy Pacific Fleet command headquarters permitted accelerating the assessment of the state of combat readiness of this large strategic formation threefold.

During 1982-1985 the Mitre Corporation developed [razrabotat] the Analyst expert system for converting reconnaissance data of a varying nature to a graphic situation display scheme with critical situations highlighted. It was created [sozdavatsya] within the framework of a program being developed [razrabatyvat] by DARPA in support of combat operations control in conducting the air-land operation (battle). A prototype of the expert system, OB.1 KB (Order of Battlefield [sic] Variant No. 1 Knowledge Base), was constructed as a result of interfacing the Analyst system with equipment for displaying a digital scheme (map) of the terrain.

Variant No. 1 of this system, made for a division, permits depicting combat formations on the battlefield. It was prepared for use as a reserve means of analyzing the combat situation during the Caber Musket command and staff exercise conducted in May 1986 on the basis of the U.S. Army 9th Infantry Division. A conventional plastic map with data updated using colored pencils as well as an automated system for collecting reports and reconnaissance data on the situation comprised the basic means for displaying the situation. The experience of conducting the exercise confirmed from the very beginning the following advantages of the expert system: graphic effect and informative nature of the electronic map along with the capability of detailing (enlarging) any terrain sectors of interest; representing processed data on the map in standard conventional notation; depicting objects dynamically; plotting various graphic information on the map; the capability of reproducing the preceding situation and variants of its future development with a return to the current situation, and so on.

A prototype of an expert system was developed [razrabotat] for the Air Force for troubleshooting in servicing the B-1B strategic bomber. According to American specialists' calculations, its implementation will allow saving some $160 million in maintaining each aircraft during its flying life. Current Air Force expenditures for research in the field of artificial intelligence reached $25 million in 1987. It is expected that they will double in the next fewears.

In studying the problem of software for artificial intelligence equipment, a number of American specialists in the programming field consider it possible to use the ADA high level language for this purpose, which has all the best qualities of the LISP and PROLOG specialized languages and even surpasses them in such indicators as modularity and speed. In the experts' assessment, its use will accelerate the development [razrabotka] and introduction of artificial intelligence equipment in the Armed Forces, which is the basis of measures for standardizing military equipment and weapons being taken by the U.S. Defense Department. In addition, the choice in the early 1980's of the ADA language as standard and in time as mandatory for Armed Forces is considered by Pentagon representatives to be the key measure which will permit overcoming serious difficulties which have arisen in recent years in the question of financing and providing human resources for the development [razrabotka] and operation of computer software.

The experience of developing [razvitiye] technology for automating combat control in the U.S. Armed Forces indicates that creation [sozdaniye] of artificial intelligence equipment with a combat purpose is at the stage of conceptual evaluation of its overall configuration and

limits of application; principles of constructing knowledge bases; development [razrabotka] and selection of superhigh level languages and computer architectures for their use; and creation [sozdaniye] of advanced systems for building expert systems. All these questions are being resolved with consideration of prospects for standardizing and unifying both software and the computer hardware base.

Wide introduction of expert systems of a supporting nature which will permit real-time analysis of a situation that is subject to formalization to a considerable extent should be expected in the next few years. These will be automated control complexes of advanced technical systems built on knowledge bases, means of automatic interpretation of the data of visual reconnaissance and recognition of targets in weapon systems, systems for data storage and situation synthesis based on processing data of a varying nature, and devices for input-output of data (including speech and graphic data) not processed by an operator who has no programming experience.

According to calculations of Western specialists, development [razrabotka] of automation equipment with elements of decisionmaking in an arbitrary situation will begin no earlier than the year 2000 on the basis of achievements in the field of logical programming and creation [sozdaniye] of super-efficient computers suitable for use in a combat situation.

6904

British Army Air Defense

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[Article by Col S. Anzherskiy]

[Text] In taking account of the experience of military conflicts of the 1980's, the British Army command devotes much attention to perfecting the organization of troop air defense, outfitting large and small units with modern air defense weapons, modernizing existing surface-to-air missile systems, and training personnel for effective performance of combat missions of repelling an air attack by the enemy in all forms of the battle and operation.

As reported in the foreign military press, air defense personnel and equipment in the British Army are not assigned to an independent combat arm but are included in the artillery. They have three antiaircraft missile regiments and antiaircraft batteries of portable antiaircraft missile systems which are an organizational part of large combined-arms units. The territorial troops have four antiaircraft missile regiments (equipped with portable antiaircraft missile systems). Antiaircraft missile regiments equipped with Rapier self-propelled and towed antiaircraft missile systems (around 150) and the Blowpipe or Javelin portable antiaircraft missile systems are considered the basic tactical unit of troop air defense.

The bulk of Army air defense personnel and equipment is concentrated in the 1st Artillery Brigade of I Army Corps stationed in the FRG. The brigade includes two antiaircraft missile regiments, each of which consists of a headquarters, headquarters battery, four Rapier antiaircraft missile batteries (each with two platoons of six self-propelled Rapier antiaircraft missile systems each) and combat and logistical support subunits. The self-propelled Rapier antiaircraft missile system team consists of three persons. It takes 30 seconds to shift the system from a traveling to a combat position. The maximum range for engaging airborne targets is up to 5 km, the unit of fire is 20 missiles (carried on a tracked transporter), and reloading time for eight missiles is no more than 5 minutes. The regiment has a total of 48 Rapier self-propelled antiaircraft missile systems (Fig. 1 [figure not reproduced]) and around 600 personnel. The regiment can operate at full strength or by battery to perform a combat mission. In wartime the army corps can be reinforced by one or two antiaircraft missile regiments from territorial troops in Great Britain.

Air defense is organized and conducted in all forms of the battle and operation, in making a march, when troops are disposed in concentration areas, and in other instances. Measures for screening troops and rear installations include reconnaissance of the air enemy, troop notification about the air enemy, combat actions of antiaircraft missile units and tactical aviation, and the coordinated fire of antiaircraft weapons and small arms of mechanized and tank subunits.

Responsibility for planning and organizing air defense of the army corps rests with the chief of corps artillery. Depending on the assigned mission, form of combat actions, terrain relief, and availability of organic and attached weapons, he allocates them among the large units [soyedineniye] and determines the importance of installations and the procedure for covering them and for coordinating with tactical aviation.

In establishing an army corps air defense system, preference is given to concentrating principal efforts on covering first echelon large and small units, control entities, nuclear attack weapons and other important installations. In particular, organic weapons can be assigned the mission of providing a defense for first echelon divisions and for command posts and facilities in the first echelon's rear area. Two or three Rapier antiaircraft missile batteries are assigned for covering combat formations of a first echelon division and one battery each is assigned to cover the corps command post and Lance guided missile positions.

British military specialists believe that Rapier antiaircraft missile batteries can provide cover for an area 10x15 km in size. It is recommended that antiaircraft missile systems be placed at a distance of up to 4 km from each other and up to 3 km from the object to be covered to ensure overlapping impact zones and mutual cover of the batteries' positions. As a rule a platoon of Rapier antiaircraft missiles (six antiaircraft missile systems) and in some cases teams of portable Blowpipe antiaircraft missile systems, Fig. 2 [figure not reproduced], (or Javelin, Fig. 3 [figure not reproduced]), are assigned to cover alternate command posts, bridges, crossings and other objects.

The chief of artillery plans and organizes air defense in the armored division. The Blowpipe (Javelin) antiaircraft missile battery, which includes three platoons of three squads each, is the division's organic air defense resource. A squad consists of four teams, each armed with one launcher and a unit of fire of missiles. Spartan APC's are used to transport the teams. There is a total of 36 portable antiaircraft missile systems in a battery.

The armored division's air defense may be reinforced by the corps commander's weapons depending on its position in the operational alinement of the army corps and on the mission to be accomplished. For example, when the division operates on the corps axis of main attack it may receive up to two Rapier antiaircraft missile batteries and one or two Blowpipe (Javelin) antiaircraft missile batteries. Up to a battery of Rapier antiaircraft missiles is attached to a large unit advancing on a secondary axis. When an armored division is in the army corps second echelon or reserve, its cover is provided by corps air defense weapons.

Foreign military specialists believe that primary attention in the overall armored division air defense system must be focused on ensuring cover of first echelon brigade combat formations, the large unit's command post, and nuclear artillery positions. Antiaircraft missile subunits can operate at full strength or may be attached by platoon to brigades.

The army corps staff exercises centralized control of combat operations of Rapier antiaircraft missile units and subunits based on available information about the air enemy by assigning missions for destroying specific targets or by specifying sectors or areas of the air space within which they must conduct the search and engagement of airborne targets. Communications usually is maintained with the fire batteries over radio nets of the army corps and armored divisions.

A squad of portable antiaircraft missile systems is assigned to provide air defense of a battle group (a reinforced mechanized battalion or tank regiment). The squad commander specifies the teams' positions, the most likely avenues of air enemy operations, and the procedure for conducting fire against targets. The squad commander controls the teams' actions based on data received and by independent acquisition of airborne targets in an assigned sector or zone.

In the assessment of the army command, the personnel and equipment it has are capable of accomplishing missions of air defense of large and small units. Meanwhile the foreign press emphasizes that at the present time the question of increasing the effectiveness of troop air defense is being examined and practical measures are being taken to improve the structure of units and subunits and outfit them with modern weapons for engaging airborne targets.

In particular, in the next few years it is planned to activate the 15th Antiaircraft Missile Regiment as part of the 1st Artillery Brigade, I Army Corps. The regiment will be equipped with Starstreak portable antiaircraft missile systems, the development [razrabotka] and testing of which are still continuing. At the present time a self-propelled prototype of this system mounted on the Stormer amphibious APC also has been created [sozdat]. It is planned to begin their production in 1990. The combat weight is 12 tons, maximum speed is 80 km/hr, the range is 650 km, and it has a crew of three. A launcher (8 tubes) and sighting equipment are mounted on a rotating platform in the rear of the vehicle, the organic unit of fire (12 missiles) is in transport-launch containers, and the maximum range for engaging airborne targets is up to 7 km (Fig. 4 [figure not reproduced]). In addition development [razrabotka] is under way on a future Rapier-2000 antiaircraft missile system which will enter the inventory of army antiaircraft missile units and subunits in the 1990's.

6904

U.S. Armored (Mechanized) Division Logistic Support

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[Article by Col N. Burul, candidate of military sciences]

[Text] The U.S. Army command considers the comprehensive and uninterrupted logistic support to ground forces to be a very important factor determining their successful conduct of combat operations. Based on experience of the U.S. Armed Forces' participation in World War II and subsequent local wars and military conflicts, American military specialists emphasize that the importance of all kinds of logistical support (material, technical, medical) and their influence on the course and outcome of military operations are continuously growing. In the opinion of military experts, all rear elements must have high survivability, mobility, and capabilities of independently accomplishing missions of material

and technical support to troops in the operation and battle for a certain period of time. In this connection the U.S. Army command devotes much attention to constantly improving the system of troop logistical support, considering that effective use of its capabilities contributes to a fuller display of combat qualities of large and small units.

The foreign press emphasizes that while a soldier can preserve and even increase his capability of functioning by mobilizing emotional and physical forces under conditions of combat operations despite temporary interruptions in supply of food, clothing and so on, such a situation is absolutely precluded with respect to the equipment and weapons in his hands: any engine is incapable of operating without fuel, a weapon becomes only a burden without ammunition in a number of situations, and deficiencies in servicing combat equipment inevitably will be the cause of its premature wear and breakdown.

Therefore the American command devotes great attention to increasing the efficiency of the rear's work, to ensuring uninterrupted material and technical support to unit and subunit combat operations, and to establishing the optimum ratio between combat and rear units. It proceeds from the assumption that as new kinds of weapons and military equipment come into the inventory the number of personnel in combat teams has a tendency to drop inasmuch as there is an increase in the degree of automation of control over the given systems. At the same time maintaining such weapons and supporting them with ammunition, POL and other supply items become more complicated and require an increase in the number of attendant personnel in rear units and subunits; under present-day conditions this has a greater effect on combat readiness and combat capabilities of units and subunits than before.

The foreign military press reports that at the present time the program for further organizational development of the ground forces (Army-90) continues to be implemented, and in accordance with it an improvement is being made in the structure of "heavy" large units (armored and mechanized divisions), including the structure of their logistical support entities brought together organizationally in a support command.

The **division support command** is headed by the chief of the division rear, who is responsible for the following: supplying units and subunits with all kinds of allowances; delivering supplies by motor and other forms of transport; evacuating and repairing weapons, military equipment and various materiel; collection, medical aid and evacuation of wounded and sick; accommodating and transporting rear units and subunits and organizing their security and defense; collecting and evacuating property, weapons and equipment that have been captured or are unsuitable for use; burying servicemen who died or were killed in combat. It includes a headquarters and MTO [logistical support] center, headquarters company, three brigade logistical support battalions, a division logistical support battalion and an aircraft equipment maintenance company.*

American specialists note that division logistical support includes the following missions: its organization; material, technical and medical support; as well as control of the activities of logistic entities.

Organization of logistical support of the division presumes fulfillment of a number of measures connected with assigning rear areas, accommodating and transporting rear units and subunits, assigning and servicing main supply and evacuation routes, and taking steps for security and defense of rear areas. The bulk of personnel and equipment will be disposed in the combat zone. Corps and division rear areas as well as brigade and battalion rear deployment areas are assigned to establish the territorial responsibility of appointed persons for accommodating rear entities there. The distance of rear subunits from combat formations is determined by the planned troop requirement for supplies, nature of the terrain, and conditions of the combat situation; depending on displacement of the corps rear, the distance can be 4-5 km for a battalion and 10-15 km for a brigade (in the offensive and on the defense), and for a division 25-35 km in the offensive and 35-50 km on the defense. During an offensive rear units and subunits displace following the advancing troops and deploy as necessary to support them; on the defense they are disposed behind combat formations of the supported units.

Supply and evacuation routes in the division rear area are assigned by the division staff and prepared by engineer battalion personnel and equipment by direction of the chief of the division engineer service. As a rule two or three main supply and evacuation routes are prepared and maintained in the division, with traffic over them regulated by the military police.

Material support of troops is the basis of logistical support and is a subject of constant activity not only of rear entities, but also of commanders at all levels. Troop combat readiness and combat effectiveness depend on the completeness with which their requirements for supply items are satisfied.

The division support command exercises immediate direction over the work of rear entities and over the distribution of supplies.

The U.S. Armed Forces have adopted a unified classification of supply items to simplify supply accounting, requisitioning and distribution. According to this classification they are divided into ten classes: I—rations; II—clothing property, personal gear and other supply items prescribed by tables of organization and equipment; III—POL; IV—construction materials for building protective works and obstacles; V—all kinds of ammunition

including chemical, nuclear and special-purpose, explosives, mines, missiles and rocket fuel; VI—items of personal use (nonmilitary retail trade commodities for servicemen); VII—weapons and combat equipment; VIII—medicines, medical gear and equipment; IX—spare parts, machine units, assemblies and maintenance systems; X—supplies for supporting nonmilitary economic development programs and equipment for nonmilitary purposes not included in the list of the other nine classes.

The foreign press reports that stores of supplies for conducting combat are established in the division based on an average daily requirement for supply items per serviceman, which can be 100 kg or more. Of this, ammunition can account for up to 60 percent, POL for up to 30 percent, and other supply items 10 percent. The consumption of supplies in 24 hours of medium-intensity combat operations can be 2,200 tons. Combat subunits (battalions) have stores of supplies for two days, and subunits of the division support command have stores for three days.

The requirement for ammunition and POL is based on effective instructions, reference documents, or practical experience. The bulk of ammunition is delivered to users from army corps depots to ammunition transfer points deployed in brigade and division rear areas, as well as to ammunition supply points accommodated in the corps rear area near the division rear boundaries. In some cases ammunition can go to the divisions or brigades from ports or from unloading zones, bypassing corps depots. Ammunition is delivered to battalions by brigade transport (sometimes by using battalion transport), and directly to combat formations by battalion transport.

Delivery of POL from corps depots to division supply points is by corps transport, and from division supply points to the battalions by division transport. Combat vehicles are fueled by battalion fuel supply vehicles directly in combat formations or near the disposition of rear subunits attached to the battalion.

Stores of other supplies are replenished as follows: they go from depots in the TVD [theater of military operations] and partly from corps depots to division supply points, and from division supply points to brigade supply points or directly to battalions. Delivery is by the senior commander's personnel and equipment. Helicopters and aircraft can be used to deliver supplies from division supply points directly to subunit combat formations, especially for large and small units and subunits operating in isolation from the main body.

Technical support of large units includes maintenance, repair and evacuation of equipment as well as supply of spare parts and repair equipment to the troops. A system of planned preventive work is the basis for organizing equipment maintenance. This system provides for a certain kind of mandatory servicing after the expiration of an established time period or mileage.

The army command carries out a broad set of measures aimed at further improving the effectiveness of the maintenance system. In particular, the dissociated nature of repair by technical services has been eliminated and repair subunits have been established which specialize in repairing certain types of vehicles. In the organization of equipment repair each repair element performs that kind of work governed by corresponding instructions. Vehicles with combat damage are repaired where they were disabled, at damaged vehicle collection points, or in areas indicated by the appropriate chief. A general-purpose monitor is presently being developed [razrabatyvatsya] and introduced to the troops which permits not only finding the damage, but also indicating the method of fixing it as well as determining the spare parts needed for repairs.

Responsibility of the higher echelon for timely evacuation of equipment from a lower echelon with its own personnel and equipment is the basic principle in organizing evacuation of damaged equipment, although use of special transport also is not precluded. It is planned to use helicopters for timely location of vehicles damaged on the battlefield.

Medical support. In the American command's views, the medical service holds one of the most important places among rear services. Its missions include conducting measures for maintaining the personnel's high combat effectiveness and, in case of illness or wounds, providing for the servicemen's fastest return to formation.

The foreign press notes that as weapons of warfare have improved and their lethality has increased the complexity and importance of missions being performed by the medical service continually rise. Based on this in recent years the U.S. Army has been searching for the optimum organization of the medical service encompassing all its subunits. The essence of such an organization is for medical assistance, evacuation and treatment of wounded and sick to take place by echelon. For example, it is proposed to organize medical support in the division rear area in two echelons. First aid at battalion-company level is in the first echelon and skilled medical assistance at division-brigade level in the second. The period for evacuating wounded from the division must not exceed three days. Collecting stations for the wounded are deployed in mechanized (tank) battalions during combat operations; personnel of these stations search for, evacuate and collect the wounded, give them urgent medical assistance and prepare them for evacuation to medical stations deployed in brigade (division) rear areas, where the wounded and sick receive skilled medical help and are prepared for evacuation to medical units and establishments of the army corps.

Command and control of support command personnel and equipment of the division is governed by appropriate regulations, manuals and other documents. They stress that overall direction is the responsibility of the division

commander, who directs the activities of rear entities through the division chief of staff and chief of rear.

After the division commander announces his decision, the chief of rear works out together with the division staff the plan for logistical support of combat, which is coordinated with the plan of combat operations and with all interested chiefs of combat arms and services. The order for the rear is drawn up simultaneously. Both documents are made known to brigade commanders and chiefs of division services with respect to the part concerning them. Guided by the division logistical support plan, the support command organizes displacement of rear units and subunits, delivery of supplies, evacuation and repair of equipment, and collection, medical assistance, and evacuation of the wounded. Command and control is exercised from a rear services command post (TPU), set up by the division support command staff 20-35 km from the forward edge. A signal company assigned by the division signal battalion organizes communications of the division support command with rear units and with brigade and battalion command posts.

The signal company deploys a mobile communications center and message center at the rear services command post, provides internal communications at the rear services command post, and includes this control entity in the division's overall communications system. In addition, radios in division rear units and subunits are used for command and control of rear personnel and equipment. The radios are intended for maintaining communications within subunits and for operating in the overall division communications system.

In the assessment of American specialists, a logistical support system has been established in U.S. "heavy" divisions that is on the whole capable of the timely and complete supply of large and small units with everything necessary under conditions of modern warfare.

Footnotes

*For more detail on organization of the U.S. "heavy" division support command see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 12, 1987, pp 19-21—Ed.

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Italian A-129 Mangusta Attack Helicopter

18010401f Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 23-28

[Article by Lt Col V. Nelin]

[Text] Having studied the experience of tactical employment of ground forces in local wars and military conflicts in the early 1970's, Italian military specialists concluded that the role of army aviation in performing a wide range of combat and auxiliary missions was growing. Based on this, considerable attention was given to plans for further organizational development and improvement of army aviation proper, including by a quality improvement in the helicopter inventory. One specific step in this direction consisted of decisions made in 1972 about the need to create [sozdaniye] a light antitank helicopter for employment under conditions of Western Europe.

Initially it was planned to develop [razrabatyvat] the new helicopter jointly with the FRG. To this end an agreement was concluded between the ground forces of both countries on requirements to be placed on the future helicopter. The Italian firm of Agusta and the West German firm of Messerschmitt-Boelkow-Blohm began parallel work on the project in 1973. Difficulties of a technical and industrial nature which arose in late 1975, however, as well as differences of opinion between the parties led to rejection of further implementation of the joint program. In 1978 Italy decided to begin independent development [razrabotka] of the new attack helicopter in accordance with its own requirements. The Army assumed around 70 percent of the cost of developing the helicopter, designated the A-129 Mangusta (see color insert [color insert not reproduced]). Agusta made extensive use of experience gained in creating [sozdaniye] the A-109 Hirundo multirole helicopter as well as of experience gained in the course of a preliminary study of the new project.

The first flight of the A-129 Mangusta prototype took place in September 1983. Agusta built a total of five prototypes for conducting comprehensive tests (Fig. 1 [figure not reproduced]). According to foreign press data, overall flying hours at the moment tests were completed were over 1,500. Series production of the first 15 helicopters began in mid-1986, their construction was completed in late 1987 and deliveries to the Army began this year. The total number of helicopters of this type ordered for outfitting two squadrons of army aviation is 60, but an additional procurement of another 30 is possible for outfitting a third squadron. In 1987 Denmark planned to acquire 20 such helicopters.

In designing the A-129 Mangusta helicopter the developers were faced with the task of creating [sozdat] a rather effective and at the same time inexpensive combat machine with a relatively high tactical survivability; this had a deciding effect on choice of weight-size characteristics and on possibilities of equipping it with appropriate weapons and flight equipment (primarily American-made).

The helicopter is designed in a single-rotor configuration with four-bladed main rotor and two-bladed tail rotor, a low wing aspect ratio, and a nonretractable tricycle landing gear with tailwheel. The nose fairing, tail boom, central fuselage panels, as well as spars are made of composite materials. According to AIR FORCE MAGAZINE reports, composite materials account for up to

45 percent of the overall weight of fuselage construction. Parts made of these materials occupy 70 percent of the airframe area. This in combination with a small fuselage cross-section (maximum width 0.95 m) provides a substantial reduction in radar cross-section.

There is a two-place crew cockpit with tandem seating arrangement. The gunner (copilot) is accommodated in the front seat and the pilot (crew commander, Fig. 2 [figure not reproduced]) in the rear. The gunner has all necessary instruments and controls for independent flying (Fig. 3 [figure not reproduced]). A stepped positioning of the seats provides the crew with an improved field of view (from -34 to +56 degrees in the vertical plane and within limits of 260 degrees in the horizontal plane). Pilot and gunner canopies are separate and side panels are jettisonable (in emergency situations). All panels of cockpit glass are flat to reduce glint.

The helicopter wing (3.2 m span) is made of composite materials. It is removable and attaches to the central part of the fuselage. Each of its panels has two attachment points.

The tail section consists of a swept fin and lower fin surface used for attaching the tailwheel, and a tilting tailplane (3 m span) attached in the middle of the tail boom. All tail section surfaces are made of composite materials.

The main rotor with articulated blades having a low vibration level is supplied with elastomeric bearings. Blade spars are made of carbon-fiber-reinforced Kevlar. The leading and trailing edges of the blade have a honeycomb construction using Nomex filler. The leading edge and tip are made of stainless steel and the skin is of composite materials. Main rotor blades are designed to withstand hits of 12.7 mm bullets. The developers assert that the helicopter has a rather low acoustic signature thanks to the chosen shape as well as peripheral velocity of blade tips of 214 m/sec. The ballistic tolerance of the main rotor hub is the very same as for the blades. All mechanical linkages and moving parts of the rotor are accommodated within the hub, which is positive from the standpoint of solving problems of preventing foreign objects from getting into them and reducing the helicopter's radar signature. The main rotor shaft is mounted on bearings not requiring lubrication. Tail rotor blades with semirigid attachment to the hub also are made of composite materials (with the exception of the leading edge of stainless steel) and have the very same combat survivability as the main rotor blades.

The helicopter's nonretractable landing gear is designed for making a landing with a vertical descent rate of up to 10 m/sec. The landing gear track is 2.2 m and the wheelbase is 6.95 m.

The helicopter power plant consists of two Gem-2 Mk 1004D British Rolls-Royce turboshaft engines (produced in Italy under license by the firm of Piaggio) accommodated in engine nacelles along the sides of the fuselage (Fig. 4 [figure not reproduced]). Dry engine weight is 140 kg, maximum continuous power 815 hp, take-off power 895 hp, and maximum emergency power (for 2.5 minutes) 950 hp. Specific fuel consumption at 50 percent of maximum take-off power is 0.295 kg/l(f)-hr. The developers succeeded in providing good access to the engines, which can be replaced in 30 minutes. Steps were taken to reduce the infrared emission of exhaust gases.

The transmission consists of a main gearbox with two separate power transmission channels, which prevents their simultaneous failure. It transmits power to the main rotor (1,300 hp with two engines operating). The transmission is directly connected (without an intermediate reduction gear) with the engine output shafts rotating at 27,000 rpm. Despite such a high rotation rate the transmission can continue operation for 30 minutes with an oil system failure.

The helicopter control system is redundant. Actuators of the fully automatic stabilization and autopilot system are combined with booster control system units. Mechanical control links have a triple electrical redundancy. There is a provision for installation of a tail rotor remote electrical control system. The helicopter's flight and technical characteristics are given below.

Weight, kg:	
Empty helicopter with equipment	2530
Fuel in internal tanks	750
Maximum combat load on underwing pylons	1000
Take-off for combat assignment	3700
Maximum take-off	4100
Flight speed, km/hr:[1]	
In a dive	315
Maximum in level flight at sea level	260
Cruising	250
Maximum rate of climb at sea level, m/sec	10.6
Static ceiling, m:	
Not counting ground effect	2390
Counting ground effect	3290
Maximum flight range with internal fuel store, km	630
Flight endurance, hours:	
With eight TOW ATGM and 20 minutes fuel reserve	2.5[2]
Maximum without fuel reserve	3

1. These and subsequent flight characteristics are given in international standard atmosphere conditions: +20 degrees Centigrade at altitude of 200 m with take-off weight of 3700 kg (except where other conditions are given).
2. Flying to a distance of 100 km basically at extremely low altitude, 90 minutes loiter in a waiting zone (including 45 minutes in a hover mode) and return to base.

The foreign press notes that American TOW ATGM's (up to eight missiles) are the basic organic antitank weapons of the A-129 Mangusta helicopter; their launchers are on external underwing attachment points. They also provide the capability of suspending modern American Hellfire ATGM's. The helicopter wing has a total of

four points designed for suspending other weapons as well, including 70-mm free-flight rockets (there are 7 and 19 tubes each in the launchers) and gun-cannon weapons (Fig. 5). If necessary a suspended wing mounting with a 12.7-mm machinegun or cannon can be accommodated beneath the helicopter fuselage (at the nose). The possibility of automatically shifting pylons (with the weapons suspended on them) in elevation within the limits of from 2 degrees upward to 10 degrees downward is provided to reduce the requirement for accuracy of the pilot in maintaining the weapon's line of sight in the process of aiming. Suspended fuel tanks can be installed on the inner underwing attachment points.

The TOW ATGM is guided to the target (maximum range of fire 3,750 m, armor penetration over 500 mm) by the gunner using the M-65 gyro-stabilized optical sight (while the pilot ensures that the helicopter's longitudinal axis is lined up with the direction to the target). The sight, in the fuselage nose, has two fields of view: wide with an angle of 30 degrees and 2x magnification used for target search and acquisition, and narrow with an angle of 4.6 degrees and 13x magnification for identifying and tracking a target as well as guiding a missile to it. In addition the helicopter is equipped with the IHADSS (Integrated Helmet and Display Sighting System) used both for aiming and for flying the helicopter. It includes pilot and gunner helmet sights as well as data display devices.

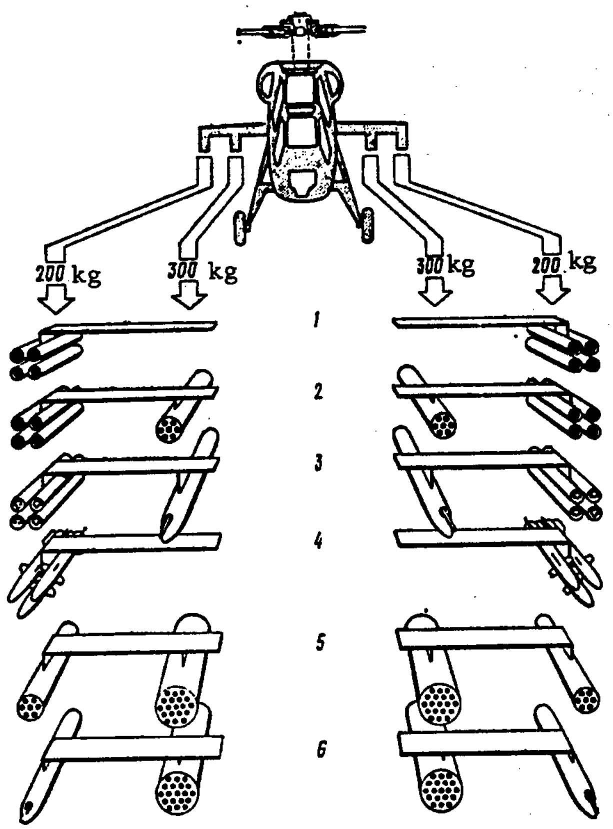

Fig. 5. Armament options for the A-129 Mangusta attack helicopter:

Key:
1. Eight TOW ATGM's
2. Eight TOW ATGM's and 14 70-mm free-flight rockets
3. Eight Hot ATGM's and two suspended pods with 12.7-mm machineguns
4. Six Hellfire ATGM's
5. 52 70-mm free-flight rockets
6. Two suspended pods with 12.7-mm machineguns and 38 70-mm free-flight rockets

A forward-looking infrared [FLIR] set (its testing began in May 1987) will be installed on the same platform with the M-65 sight in the near future for supporting night employment of weapons. Use of other modern sighting-navigation equipment including a laser rangefinder-target designator (also necessary for employing the Hellfire ATGM with semiactive laser homing head) and a laser target tracking receiver for following the target with illumination by lasers accommodated on other (airborne or ground) equipment also is planned to be used on it.

Flying the helicopter at night as well as in a nap-of-the-earth mode is accomplished with the help of the PNVS (Pilot Night Vision System), which includes the FLIR located above the sight in the fuselage nose.

In the opinion of foreign experts, one of the most interesting technical decisions on the Mangusta helicopter (along with such nontraditional ones as the absence of engine reduction gears in the transmission, accommodation of main rotor control elements within its shaft and other decisions) is the digital IMS (Integrated Multiplex System) of the American firm of Harris. This system supports control and communications among all electronic equipment systems (including the weapon control system), distribution of electrical power and power plant control, flight control system functioning, an improvement in stability, automatic computation of flight parameters, as well as automatic registration of deviations from the norm in the operation of various on-board systems and mechanisms to make their ground maintenance easier.

The basis of the IMS system is two central computers with interface units, each of which is capable of fully supporting system operation independently (Fig. 6). Data from various on-board sensors go to the interface units and from them to the computers for performing computations in real time.

The data received are reflected on multifunction displays with standard multifunction control panels in graphic and alphanumeric form, which makes it easier for the pilot and gunner to obtain various data including a navigation chart of the area with waypoint display, flight parameters, weapon status and selection, selection of radio and its operating mode, and warning signal. The

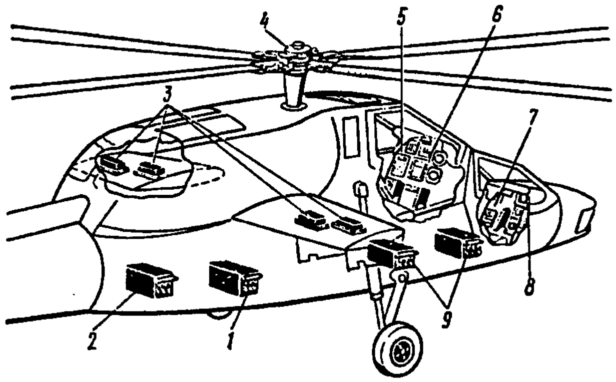

Fig. 6. Scheme of accommodation of main IMS system components

Key:
1. Control unit No 1 with central computer and interface unit
2. Control unit No 2 with central computer and interface unit
3. Wing weapon control units
4. Integral redundant system for improving stability, servos
5. Pilot control panel
6. Pilot multifunction displays
7. Gunner control panel
8. Gunner multifunction display
9. Forward electronic units with two-channel symbol generators

computer memory can store up to 100 waypoints or up to 10 flight plans, each of which contains an average of 10 waypoints; and 100 preset frequencies and radio operating modes.

The foreign press notes that in comparison with conventional helicopter equipment the IMS system provides approximately a threefold reduction in crew workload, a threefold increase in helicopter survivability in performing a combat mission, and a fourfold time reduction for maintenance of on-board electronics.

To reduce helicopter vulnerability to guided missiles with radar or laser homing systems it is planned to install American detection devices on it (the AN/APR-39(V)2 radar warning receiver and AN/AVR-2 laser warning receiver) as well as electronic countermeasures equipment (the AN/ALQ-136 active jammer of SAM system and AAA fire control radars, the AN/ALQ-144 for ECM in the infrared band, and an automatic dispenser for chaff and IR decoys). As reported in the foreign press, in parallel with operational development of the main antitank version of the A-129 Mangusta helicopter, Agusta also was working on its other versions. An agreement was signed in 1985 among the firms of Agusta, Westland Helicopters (UK) and Fokker (Netherlands) on conducting joint studies to create [sozdaniye] an advanced attack helicopter based on the given Italian model, tentatively named the Tonal. In the following year the Spanish firm of Construcciones Aeronauticas SA also acceded to the agreement. Italy intends to purchase 90 such helicopters, Great Britain 125, and the Netherlands and Spain 70 each.

6904

B-1B Bomber: Some Results of the First Years of Operation

18010401g Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press May 88)pp 37-38

[Article by Col P. Ivanov]

Text] Back in the mid-1960's the U.S. military-political leadership concluded the need for developing [razrabotka] a new strategic bomber which in time could replace the obsolete B-52. The contract for creating [sozdaniye] such a bomber, designated the B-1A, was awarded the firm of Rockwell International in 1970. During 1972-1979 the firm fabricated four B-1A prototypes which were used for flight testing, but in 1977 former U.S. President Carter announced a halt to the B-1A development program.

With the arrival of the Reagan administration to power in 1981 work under this program was resumed and the decision was made to create [sozdat] a more advanced bomber based on the B-1A, the B-1B, capable of delivering strikes in the interior of enemy territory (see color insert [color insert not reproduced]). Flight tests of its first series model began in 1984 (principal characteristics of the bomber are given below).

Weight, kg:	
Maximum take-off	216,400
Empty aircraft	87,000
Flight speed, Mach:	
Maximum (at 11,000 m)	1.25
Cruising (at 11,000 m)	0.72
Penetrating an air defense system (at 60 m)	965km/hr
Service ceiling, m	Over15,000
Maximum flight range without aerial refueling, km	11,300
Aircraft length, m	44.8
Height, m	10.4
Wingspan, m:	
Swept to 15 degrees	41.7
Swept to 67.5 degrees	23.8
Wing area, m^2	181.2

The B-1B bomber (see figure [figure not reproduced]) is fitted with a wing which can be swept in flight from 15 to 67.5 degrees. The power plant consists of four turbojet bypass engines each with a maximum thrust of 13,600 kg. There is a crew of four—two pilots, and operators of

the aircraft's offensive and defensive systems respectively. Armament is accommodated in three bomb bays and eight external stores stations. Judging from foreign press reports the following can be the maximum options of type armament of the B-1B: 22 AGM-86B air-launched cruise missiles, 38 AGM-69A SRAM guided missiles, 20 B-28 nuclear bombs, 38 B-61 or B-83 nuclear bombs; 128 Mk 82 conventional 500 pound bombs and 38 Mk 84 2,000 pound bombs.

The cost of one B-1B aircraft is around $270 million; construction of all 100 bombers planned for production ended in January 1988.

The experience of the first years of operation of the B-1B (they began entering the inventory of the U.S. Air Force Strategic Air Command in 1985) revealed a number of substantial deficiencies not only in the very organization of aircraft operation in combat units, but also in the work of individual on-board systems influencing on the whole the effectiveness of the new bomber as a unified weapon system.

With respect to the first point the foreign press notes the clearly insufficient supply of spare parts for the B-1B aircraft; spare parts deliveries were constantly delayed despite considerable funds allocated for procuring them, which could not help but affect the level of the bombers' combat readiness. In this connection it is reported that in the initial period of operation (late 1986) the need arose to replace an average of 2-2.2 assemblies or components after the sortie of each B-1B. This parameter dropped to 1.6 in the spring of 1987 and subsequently it is planned to bring it to 1.0 (as a comparison, an average of 0.4 components requires replacing after each sortie of the B-52 bomber). In order to somehow emerge from the existing situation and ensure at least partial fulfillment of the flying hours plan, American aviation specialists resorted to the practice of dismantling necessary spare parts from some aircraft for the purpose of installing them on others. For this reason 2-4 B-1B bombers constantly were in an incomplete condition. For a cardinal solution to the problem of supplying the B-1B with spare parts it is proposed to allocate around $580 million for their procurement just in the period 1989-1992, which will lead to an increase in cost of the B-1B program as a whole.

Concerning design deficiencies of the aircraft's on-board systems, the foreign press singles out as the principal ones the insufficient airtightness of the fuel and hydraulic systems as well as poor reliability of the electronic warfare system, radar, and built-in monitoring system.

Instances of fuel leaks from the integral wing and fuselage tanks were noted rather often in the process of operating the B-1B bombers. American specialists believe that considerable g-loads and a high level of vibrations arising when the aircraft flies at low altitude are their basic cause. This deficiency is gradually being remedied by efforts of Rockwell International. In particular it is reported that while there were 53 fuel leaks on 11 aircraft in June 1986, already in February 1987 41 cases of leaks were recorded on 26 bombers. In addition, a fluid leak from the hydraulic system designed for a pressure of 281 kg/cm^2 was repeatedly registered. As technical personnel gained experience in servicing the overall hydraulic system, its titanium lines and their connections, however, the number of hydraulic fluid leaks gradually began to drop.

Practicing B-1B flights at low altitudes using the on-board radar operating in a terrain following mode began in March 1987. The minimum flight altitude was reduced to 150 m (before this flights were permitted at altitudes of no less than 300 m) and maximum permissible flight speed at these altitudes was increased from 1,050 to 1,100 km/hr. By the end of 1987 it was planned to bring the B-1B's minimum flight altitude to 60 m, which should conform to conditions of the bomber's employment in wartime with penetration of an air defense system. The western press notes as a deficiency in operation of the low altitude terrain avoidance flight support system the repeated cases where the radar reacted to metal structures and constructions on the ground, taking them for elevations, which led to an automatic increase in aircraft altitude for overflying them.

In the course of B-1B flights substantial deficiencies were revealed in the operation of the on-board AN/ALQ-161 electronic warfare system—the largest airborne EW system of all those previously created [sozdat] in the United States (it consists of 118 units and weighs a total of around 2,300 kg). The principal reasons for the deficiencies are considered to be an imperfection of the computer program controlling system operation, and electromagnetic incompatibility of the system's active equipment and certain aircraft electronics. American specialists assume that a substantial modification of the EW system will be required to ensure accomplisment of all design missions using the system. It is planned to allocate around $130 million for these purposes during 1988-1989. The system's complete readiness is expected by 1990.

Poor reliability of the built-in on-board monitor system was noted during operation of the B-1B bomber. On practically every flight it signaled a considerable number of failures or malfunctions in aircraft systems. In particular, in late 1986 the system produced signals about the appearance of an average of 110-120 malfunctions and failures, and by March 1987 it signaled 74; in both cases around half were erroneous or false. In accordance with existing Air Force specifications, the number of false or erroneous failures and malfunctions registered by the built-in monitor system during each flight was planned to be reduced to 10 by the fall of 1987 and later even to 3.

The above deficiencies in operation of B-1B bomber on-board systems led to the fact that the overall flying-hours plan and the flying hours for each aircraft were unfulfilled, and this affected training rates of flight

personnel. For example, by April 1987 there were only 13 crews for the 30 B-1B aircraft delivered by that time, and of those crews not one had been trained to execute combat missions to the full extent. In attempting to correct that situation the U.S. Air Force command plans to have 1.37 crews for each B-1B bomber as early as December 1988.

American military experts believe, however, that despite the deficiencies identified in the course of the first years of operation (which are typical of any new weapon system in a similar stage of assimilation) even today this bomber could be used in war even with certain substantial restrictions on combat employment.

6904

Mobile Logistic Support in NATO Country Navies

18010401h Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 45-51

[Article by Capt 2d Rank A. Biryusov]

[Text] Reliable mobile logistic support is considered a very important factor determining successful conduct of combat operations by naval forces. It contributes to an increase in the operating endurance of combatant ships and reduces their dependence on shore bases. In this connection NATO countries, and the United States above all, attach great importance to improving the system of mobile logistic support of naval forces.

The principal functions of the mobile logistic support system are support of forward U.S. Navy groupings; underway replenishment of ships of NATO country navies; sea transportation of supplies in naval interests; and salvaging, repair, material handling, and other work.

Mobile logistic support vessels are subdivided into two groups in accordance with specific missions: vessels for supplying ships at sea and combat support and service vessels. The first group includes ammunition transports (in the United States, special weapons and ammunition transports), fast all-purpose supply transports, supply transports, and oilers; the second group includes submarine and destroyer tenders, SSBN tender supply transports, repair ships, salvage ships, floating docks, and tugs. The table gives principal performance characteristics of various classes of vessels.

In accordance with the administrative organization in the **U.S. Navy** all forces for mobile logistic support to surface combatants are placed in two groups of service ships (one each in the Atlantic and Pacific fleets), which consist of squadrons including auxiliary vessels for various purposes: special weapons and ammunition transports, fast all-purpose supply transports, supply transports, and oilers. The squadrons additionally include destroyer tenders, salvage ships and tugs. They are assigned to regular naval forces or to the Military Sealift Command [MSC]. Logistic support of submarines, including missile submarines, is accomplished with the help of tenders included in submarine groups and squadrons.

The regular naval forces have over 80 auxiliary vessels, which include the following underway replenishment vessels: 12 special weapons and ammunition transports (the notation adopted in the U.S. Navy is AE), 4 fast all-purpose supply transports (AOE), 7 supply transports (AFS) and 14 oilers (AO, AOR). In addition, over 20 vessels from the MSC including up to 15 oilers are used for these purposes.

According to the operational organization, supply vessels are placed in mobile logistic support units, which are subdivided into groups, to support combat groupings of fleets at sea. The mobile logistic support units (a total of seven) are attached one each to the Second, Third, Sixth and Seventh fleets, two are directly subordinate to the CinC Atlantic Fleet and one to the CinC Pacific Fleet. Depending on the nature of missions to be performed a unit includes from two to ten groups, each of which can have 5-10 vessels.

Mobile logistic support forces of the **British Navy** are formed from vessels of the auxiliary fleet and fleet auxiliary service, which are part of the naval command on the territory of Great Britain. Auxiliary vessels are not placed in units. There is a total of around 50 various auxiliary vessels, including 3 ammunition transports, 4 all-purpose supply transports, 14 oilers, 13 ocean tugs and 11 salvage vessels.

If necessary, some merchant fleet vessels can be transferred to operational subordination of the Navy. For example, for the operation to seize the Falkland (Malvinas) Islands during the 1982 Anglo-Angentine conflict up to 45 vessels of civilian departments were used after first undergoing modification with consideration of upcoming missions.

In the **FRG Navy** mobile logistic support missions are accomplished by a supply flotilla which organizationally is part of the naval command. The flotilla consists of two squadrons. There is a total of 24 vessels, of which there are 8 all-purpose supply transports, 2 ammunition transports, 9 oilers and 5 tugs. Ten "Rhein"-Class tenders organizationally are part of flotillas of submarines, guided missile patrol boats and minesweeping forces. In the latter half of the 1990's it is planned to replace all-purpose supply transports with new ones (Project KVS-90) with a displacement of around 12,000 tons and capable of performing missions of mobile logistic support to striking and hunter-killer forces of modern surface combatants to the full extent. It is planned to build four such transports.

Performance Characteristics of Selected Classes of Supply Vessels of NATO Country Navies

Vessel Class--Number in Commission (Hull Numbers), Year Built, Nationality	Full Displacement, tons	Principal Dimensions, meters: Length, Beam, Draft	Maximum Speed in Knots	Armament*, Supplies (Cargoes) for Transfer
Ammunition Transports (Special Weapons and Ammunition)				
"Kilauea"--8 (AE 26-29, 32-35), 1968-1972, USA	18,000	172 24.7 8.5	20	76-mm gun mount--2x2 (except AE 26), 20-mm Vulcan-Phalanx AAA system--2x6 (on AE 32-35), UH-46 Sea Knight helicopters--2; ammunition, including nuclear--6,500 tons
"Suribachi"--5 (AE 21-25), 1956-1959, USA	16,000	156 22 8.8	20	76-mm gun mounts--2x2; ammunition, including nuclear--7,500 tons
"Westerwald"--2 (A 1435, 1436), 1967, FRG	3,500	105 14 3.7	17	40-mm gun mount--2x2; ammunition--up to 1,000 tons
All-Purpose Supply Transports				
"Sacramento"--4 (AOE 1-4), 1964-1970, USA	53,600	242 32.6 12	26	20-mm Vulcan-Phalanx AAA system--2x6, UH-46 Sea Knight helicopters--2; fuel--30,850 m^3, weapons, ammunition and other stores--2,600 tons
"Fort Grange"--2 (A 385, 386) 1978-1979, UK	23,400	184 24.1 8.6	22	20-mm gun mount--2x1, Sea King helicopters--4; fuel--12,800 m^3, weapons, ammunition and other stores--3,500 tons
"Durance"--4 (A 607, 608, 629, 630), 1980-1987, France	17,800	137 21.2 10.8	19	40-mm gun mount--1x1 and 2x1 (on A 607), 20-mm--1x2, Lynx helicopter; boiler and diesel fuel--around 9,000 tons, aviation fuel--500-1,000 tons, water--130-260 tons, weapons, ammunition and other stores--200-370 tons
"Stromboli"--2 (A 5327, 5329), 1975-1978, Italy	8,700	129 18 6.5	18	76-mm gun mount--1x1, 40-mm gun mount--2x1; boiler and diesel fuel--4,000 tons, aviation fuel--400 tons, various stores--300 tons

[Table continued on next page

*Number of gun mounts, AAA systems and barrels in them are denoted by digits separated by a multiplication sign.

Performance Characteristics of Selected Classes of Supply Vessels of NATO Country Navies [continued]

Vessel Class--Number in Commission (Hull Numbers), Year Built, Nationality	Full Displacement, tons	Principal Dimensions, meters: Length, Beam, Draft	Maximum Speed in Knots	Armament*, Supplies (Cargoes) for Transfer
		Supply Transports		
"Mars"--7 (AFS 1-7), 1963-1970, USA	16,500	177 24.1 7.3	20	76-mm gun mount--2x2, 20-mm Vulcan-Phalanx AAA system--2x6, UH-46 Sea Knight helicopters--2; provisions & various stores-- around 4,000 tons
"Sirius"--3 (AFS 8-10), 1966-1967, USA	16,800	160 22 6.7	18	UH-46 Sea Knight helicopters--2; provisions & various stores--around 4,000 tons
"Lueneburg"--8 (A 1411-1418), 1966-1968, FRG	3,500	104 13.2 4.2	17	40-mm gun mount--2x2; weapons, ammunition & other stores
		Oilers		
"Cimarron"--5 (AO 177-180, 186), 1981-1983, USA	26,100	180.5 26.8 10.7	20	20-mm Vulcan-Phalanx AAA system--2.6; bulk liquid cargoes--19,000 m^3
"Wichita"--7 (AOR 1-7), 1960-1976, USA	38,100	201 29.3 10.2	20	20-mm Vulcan-Phalanx AAA system--2x6, 20-mm gun mount--4x1 (on AOR 6), UH-46 Sea Knight helicopters--2; bulk liquid cargoes--25,440 m^3, provisions, spare parts & other stores--900 tons
"Henry Kaiser"--4 (AO 187-190), 1986-1987, USA	40,000	206.7 29.7 10.5	20	Bulk liquid cargoes--28,600 m^3
"Neosho"--6 (AO 143-148), 1954-1956, USA	40,000	199.6 26.2 10.7	20	Bulk liquid cargoes--28,600 m^3
"Mispillion"--5 (AO 105-109), 1945-1946, USA	34,750	196.3 22.9 10.8	16	Bulk liquid cargoes--23,850 m^3
"Rover"--5 (A 268-271, 273), 1969-1974, UK	11,520	140.6 19.2 7.3	19	20-mm gun mount--2x1, Sea King helicopter; boiler, diesel & aviation fuel--up to 6,600 tons

*Number of gun mounts, AAA systems and barrels in them are denoted by digits separated by a multiplication sign.

In the **French Navy** logistic support of ships at sea is organized by means of mobile logistic support vessels which are part of the naval commands in the zones. For a period of joint operations they are transferred to the subordination of commanders of operational ship forces, detachments and groups. The navy has a total of four all-purpose supply transports, six oilers, five tenders and a repair ship.Mobile logistic support forces also exist in the navies of other NATO countries. They do not represent an integral system, however, but are limited only to individual elements.

Foreign specialists believe that fleet forces must be ready for lengthy operations with consideration of the nature of future naval warfare. This will depend first of all on reliable functioning of the naval rear and above all of the mobile logistic support forces.

Based on these views, specialists in NATO countries have drawn up the following general requirements for service vessels which must operate in cruising orders of combatant ship forces. Above all they must have the necessary endurance, speed and maneuverability; have weapons aboard for self-defense against the air enemy; be capable of transferring cargoes at a speed of up to 20 knots to several combatant ships simultaneously by all known methods (alongside, astern, vertical), including under difficult hydrometeorological conditions; have the principal kinds of logistics aboard; have the capability of comprehensive supply of force ships during one sortie regardless of the vessel's purpose; and have capacities of repairing combatant ships and aircraft equipment.

The purpose, present status and development [razvitiye] prospects of the principal types and classes of mobile logistic support vessels in NATO countries are examined below.

Ammunition transports (special weapons and ammunition transports) are intended for delivering items of armament and ammunition to ship force operating areas and supplying them to the combatant ships. The United States presently has 13 special weapons and ammunition transports, including 8 "Kilauea"-Class and 5 "Suribachi"-Class. They are equipped with the FAST system permitting underway transfer of cargoes, including missiles, through four transfer stations. It is planned to continue building ships of this type. Thus in accordance with the shipbuilding program (1988-1992) it is planned to allocate funds for building two special weapons and ammunition transports and thus bring their total number to 15.

The two "Westerwald"-Class ammunition transports in the FRG Navy will be decommissioned in connection with reaching maximum operating life by the year 2000. The British Navy has three "Kinterbury"-Class ammunition transports (full displacement of each is 21,200 tons). Combat equipment and weapons also are transported by all-purpose supply transports. The fleets of other West European countries have no ammunition transports and do not plan to build them.

All-purpose supply transports provide underway replenishment of combatant ships with fuel including aviation fuel, food products, fresh water and other supplies. The U.S. Navy has such fast "Sacramento"-Class vessels (Fig. 1 [figure not reproduced]) and according to the shipbuilding program it is planned to allocate funds for building another four vessels for this purpose. They will be able to take aboard up to 25,000 m^3 of bulk liquid cargoes, 1,800 tons of weapons and ammunition, and over 600 tons of other logistic items. It is expected that construction of these four vessels will be completed by 1994. The British Navy has vessels of the "Fort Grange"-Class (2) and "Resource"-Class (2, Fig. 2 [figure not reproduced]) and a new series of "Fort Victoria"-Class transports is being built with a displacement of 31,600 tons and useful capacity of 12,000 m^3 of bulk liquid cargoes and around 7,000 tons of solid cargoes. It is planned to transfer the lead vessel to the auxiliary fleet in 1990. All-purpose supply transports in the French and Italian navies are represented by "Durance"-Class (four in commission and one being built) and "Stromboli"-Class (2) vessels respectively.

American "Mars"-Class (7) and "Sirius"-Class (3) *supply transports* are being employed for providing ships in combat mission areas with provisions and spare parts both for the ships themselves and for aircraft and helicopters, as well as with expendable stores. West German "Lueneburg"-Class supply transports (Fig. 3 [figure not reproduced]) also can provide ships with missiles and ammunition.

Oilers are employed for transporting oil products, replenishing the fuel stores of combatant ships, as well as for underway replenishment of other kinds of supplies.

The U.S. Navy has 14 oilers in the regular fleet, including 12 modern ones (five "Cimarron"-Class, Fig. 4 [figure not reproduced], and 7 "Wichita"-Class), as well as 2 built in 1945 ("Caloosahatchee" and "Canisteo"). The latter have a capacity of around 22,730 m^3 (for bulk liquid cargoes), but their capabilities for underway replenishment of ships with other logistic items are limited. The most versatile are "Wichita"-Class vessels which, in addition to bulk liquid cargoes, can take aboard up to 900 tons of provisions, spare parts and other items. Navy specialists believe that to satisfy Navy requirements it is necessary to have up to 15 "Sacramento" and "Wichita" class vessels. The MSC has six "Neosho" oilers (1954-1956, 28,600 m^3), five "Mispillion" (1945-1946, 23,850 m^3) and four modern "Henry Kaiser" oilers (28,600 m^3), construction of which is continuing (it is planned to have a total of 19). The latter will gradually replace "Neosho"-Class and "Mispillion"-Class vessels in the MSC.

Construction of new oilers is not envisaged in Great Britain in the near term. The following classes of vessels will remain part of the auxiliary fleet: "Rover" (5, full displacement of 11,520 tons each), "Appleleaf" (4, 40,200 tons), "Olwen" (3, 36,000 tons), "Tidespring" (27,400 tons) and "Oakleaf" (49,310 tons).

Destroyer tenders provide comprehensive services for cruisers (including atomic-powered cruisers), destroyers and frigates with varied weapon systems including missiles. Only the U.S. Navy has such vessels: two "Samuel Gompers"-Class built during 1967-1968, four "Yellowstone"-Class (1980-1983) and three obsolete "Dixie"-Class (1940-1944). Construction of new tenders of this type is not planned by NATO countries.

Submarine tenders are intended for restoring combat effectiveness of submarines in the period between deployments. Submarine tenders are most widely represented in the U.S. Navy, where there are 13. "Lawrence Y. Spear" (2) and "Emory S. Land" (3) class tenders are modern. The latter are intended especially for servicing "Los Angeles"-Class multirole nuclear-powered submarines. Up to four SSN's can be alongside such a vessel simultaneously.

Tenders of the following classes support the forward basing of SSBN's: "Simon Lake" (2), "Hunley" (2) and "Proteus" (1). SSBN tenders exist only in the U.S. Navy. They have spaces for storing ballistic missiles, antisubmarine guided missiles and torpedoes, and other supply items. It is possible that "Hunley"-Class SSBN tenders built during 1962-1963 as well as the "Fulton"-Class SSN tenders (3, 1941-1945) will be replaced by new ones before the end of the 1990's.

There are tenders in addition in the French Navy (five "Rhone"-Class [sic]) and the FRG (ten "Rhein"-Class). They support combatant ships and small combatants of various types. Construction of new tenders is not planned in European NATO countries in the very near term.

SSBN tender supply transports are intended for transporting ballistic missiles as well as other armament and cargoes from the continental United States. This type is represented in the U.S. Navy by two "Norfolk"-Class transports and the ship "Vega". It is planned to replace the first two by the end of the 1980's with vessels refitted from Type C3-S-33a dry cargo vessels. It is planned to rebuild them with consideration of the capability for transporting 16 Poseidon C-3 and Trident ballistic missiles and for carrying torpedoes, oil products and liquefied gas.

Repair ships perform routine repairs of weapons and technical equipment of ships operating as part of forward groupings. The U.S. Navy has three repair ships in operation built during World War II which are to be replaced by four new ones by the early 1990's. The French Navy has the modern repair ship "Jules Verne." Such vessels are absent and are not being built in the navies of other NATO countries.

On the whole, according to foreign specialists' views, the system of mobile logistic support of bloc member countries permits successfully accomplishing missions facing the navies in peacetime and in the initial period of war. At the same time they admit that it is necessary to broaden the rights of command authorities of the NATO allied naval forces for giving greater flexibility to employing the mobile rear in wartime. In addition, it is believed that a portion of the auxiliary vessels requires replacement or modernization inasmuch as they no longer fully meet the increased demands placed on the system of logistic support at sea in connection with the commissioning of combatant ships with new weapon systems intended for operations as part of striking forces under conditions of a considerable distance from friendly bases.

6904

Nuclear-Powered Guided Missile Cruisers

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No 5, May 88 (signed to press 5 May 88) p 51-56

[Article by Capt 1st Rank Yu. Petrov]

[Text] The U.S. Navy command devotes much attention to developing the surface fleet, setting aside one of the leading places in its make-up to guided missile cruisers. Under the classification adopted abroad they include ships of large displacement armed with antiaircraft, antiship and antisubmarine missile systems. Guided missile cruisers are intended for accomplishing a wide range of missions, above all for screening aircraft carriers, convoys and landing detachments; operating as part of KUG [ship striking forces]; and delivering strikes against shore targets.

The most advanced ships of this type are nuclear-powered guided missile cruisers*. With a nuclear power plant aboard they essentially have unlimited cruising range at high speed, which increases their combat capabilities, considerably expands operating areas, and increases the time in those areas. The nuclear-powered guided missile cruisers are best adapted for operations under conditions of the employment of weapons of mass destruction, since nuclear power plants do not require atmospheric oxygen for their operation and the ship can be better sealed.

In addition, the absence of smoke gases reduces corrosion of electronic equipment antenna systems and at the same time facilitates the landing of helicopters on the ships.

Meanwhile the complex technology of nuclear power plant production and operation, which place high demands on personnel training and qualification, and the high cost of building a nuclear-powered ship led to a situation where even the United States was unable to carry on large-series construction of nuclear-powered guided missile cruisers. At the present time the American

Navy has nine such cruisers: four "Virginia"-Class, two "California"-Class, as well as the "Truxtun," "Bainbridge" and "Long Beach" (Fig. 1 [figure not reproduced]). Their principal performance characteristics are given in the table.

"Virginia," "California" and "Long Beach" class cruisers have a flush-deck hull and the other ships have a hull with forecastle erection extending far to the stern. The hull is divided along its length into 16-18 watertight compartments. A high freeboard in the forebody and midship section improves seaworthiness and reduces wettability of the upper deck in a rough sea. Aluminum alloys have been used widely in superstructure constructions to reduce weight and increase metacentric stability of ships, somewhat degraded because of the surface to air missile, cruise missile and ASW guided missile launchers accommodated on the upper deck and superstructures. The foreign press notes, however, that the experience of combat operations during the Anglo-Argentine conflict over the Falkland (Malvinas) Islands demonstrated the low fire resistance of these alloys. Superstructures are heavily developed along the ships' length and beam, which is explained by the requirement for additional enclosed spaces for acommodating missile armament. The ships are equipped for operations in various climatic zones and under conditions of employment of weapons of mass destruction. In particular, air conditioning systems have been installed, automatic flap valves are used in the ventilation system, there are provisions for remote-controlled closing of hatches and doors to prevent the spread of fire and water, water screen systems have been installed, through passages have been built in the superstructure, and battle stations are accommodated basically inside the hull. Much attention was given to ensuring seaworthiness and preserving high combat capabilities when operating in unfavorable weather conditions. According to foreign press data the ships can maintain a speed of 20 knots with a wave height of 7.5 m for a lengthy time.

Two four-container hardened launchers for the Tomahawk cruise missile have been installed aboard "Virginia"-Class (Fig. 2 [figure not reproduced]) and "Long Beach"-Class (see color insert [color insert not reproduced]) ships. It is planned to install similar launchers aboard "California"-Class nuclear-powered guided missile cruisers.

Tomahawk cruise missiles of three modifications can be employed. The BGM-109A missiles with nuclear warhead and a flight range up to 2,500 km and the BGM-109C with conventional warhead (1,250 km) are intended for firing against ground targets, and the BGM-109B 454 kg fragmentation-HE warhead (up to 550 km) is intended for engaging surface combatants and vessels. A combination guidance system is used for the BGM-109A and C missiles. It includes an inertial unit with radio altimeter and the TERCOM matching system with storage of terrain contour along the flight path. The foreign press notes that accuracy of the cruise missile's approach to the target essentially is independent of flight range since TERCOM compensates for errors of the guidance system's inertial unit which increase over time. BGM-109B missiles are guided to surface targets also with the help of a combination system consisting of an inertial unit with radio altimeter (initial and middle legs of the trajectory) and active radar homing head. The flight speed of Tomahawk missiles is around 900 km/hr. At the present time development [razrabotka] has ended on one more modification of the sea-launched Tomahawk cruise missile, the BGM-109D, which in contrast to the BGM-109C will be equipped with a cluster warhead containing up to 166 small-caliber BLU-97B combined-effect bombs. It is intended for delivering strikes against shore targets.

All nuclear-powered cruisers are armed with two four-container Harpoon antiship missile launchers (RGM-84A) with a range of fire of 110-130 km to increase combat capabilities of destroying surface combatants and vessels. This missile has a flight speed of Mach 0.85, a 225 kg HE warhead and a combination guidance system: inertial unit with radio altimeter (AN/APN-194) and active radar homing head (with the PR-53/DSQ-38 radar).

The surface-to-air missile armament of nuclear-powered cruisers is represented by two Mk 13 launchers ("California"-Class ships), two Mk 10 twin launchers ("Bainbridge" and "Long Beach") for Standard missiles, and combination twin launchers (one Mk 10 for "Truxton"-Class ships and two Mk 26 for "Virginia"-Class ships) for Standard missiles and ASROC rockets. Surface-to-air missiles of four modifications can be used: Standard-1MR (RIM-66B), Standard-2MR (RIM-66D), Standard-1ER (RIM-67A) and Standard-2ER (RIM-67B). The first two of them are medium range missiles (up to 50 km) and the last ones long range missiles (up to 100 km). They have an altitude range of around 20 km and flight speed of Mach 2-2.5. The Mk 74 (only on "California"-Class ships) and Mk 76 missile fire control systems have various illuminating radars and radars for transmitting remote control radio commands (up to four AN/SPG-51, -55 and their modifications) in their make-up.

To engage submarines some of the ships are outfitted with the ASROC ASW guided missile with the eight-cell Mk 16 launcher (the Mk 26 and Mk 10 Mod.8 launchers are employed aboard the other "Virginia"-Class and "Truxton"-Class cruisers respectively for launching ASW guided missiles). The ASROC ASW guided missile is a single-stage solid-propellant missile with depth charge or torpedo (Mk 46 or Mk 44) as the warhead. It has a maximum flight range of 14.5 km with a launch weight of 454 kg (maximum effective range of fire 9 km and minimum 1.5-2 km) and a subsonic flight speed.

All nuclear-powered guided missile cruisers are equipped with two triple-tube 324-mm Mk 32 torpedo tubes (the "Truxton" with four single torpedo tubes)

Principal Performance Characteristics of Nuclear-Powered Guided Missile Cruisers

Ship Class--Number in Commission (Hull Number & Name), Year Commissioned	Displacement, tons: Standard ----- Full	Principal Dimensions, m: Length, Beam, Draft	Nuclear Power Plant Output in hp ------ Maximum speed, knots	Crew (Officers)	Armament*
"Virginia"--4 (38 "Virginia," 39 "Texas," 40 "Mississippi," 41 "Arkansas"), 1976-1980	9500 ----- 11000	178.4 19.2 9.0	100000 ------ 33	560 (40)	Tomahawk cruise missiles--2x4, Harpoon antiship missiles--2x4, Standard SAM/ASROC ASW guided missile--2x2, 127-mm gun mount--2x1, 20-mm AAA system--2x6, 324-mm torpedo tubes--2x3
"California"--2 (36 "California," 37 "South Carolina", 1974-1975	9560 ----- 11000	181.7 18.6 9.6	100000 ------ 33	550 (40)	Harpoon antiship missiles--2x4, Standard SAM--2x1, ASROC ASW guided missile--1x8, 127-mm gun mount--2x1, 20-mm AAA system--2x6, 324-mm torpedo tubes--2x3
"Truxton"--1 (35 "Truxton"), 1967	8200 ----- 9200	171.9 17.7 9.4	100000 ------ 33	520 (39)	Harpoon antiship missile--2x4, Standard SAM/ASROC ASW guided missile--1x2, 127-mm gun mount--1x1, 20-mm AAA system--2x6; 324-mm torpedo tubes--1x4; helicopter--1
"Bainbridge"--1 (25 "Bainbridge"), 1962	7600 ----- 8590	172.3 17.6 7.7	100000 ------ 33	516 (42)	Harpoon antiship missile--2x4, Standard SAM--2x2, ASROC ASW guided missile--1x8, 20-mm AAA system--2x6, 324-mm torpedo tubes--2x3
"Long Beach"--1 (9 "Long Beach"), 1961	14200 ----- 17100	219.9 22.3 9.1	80000 ------ 30	890 (85)	Tomahawk cruise missile--2x4, Harpoon antiship missile--2x4, Standard SAM--2x2, ASROC ASW guided missile--1x8, 127-mm gun mount--2x1, 20-mm AAA system--2x6, 324-mm torpedo tubes--2x3

*Number of missile launchers and gun mounts, number of tubes (containers) and barrels in them, as well as number of torpedo tubes are denoted on either side of a multiplication sign.

which fire Mk 46 torpedoes. The Mk 46 guided antisubmarine torpedoes have a combination (active-passive) acoustic homing system. The torpedo weighs around 250 kg (weight of explosives 40 kg), the speed and running depth are 45 knots and 450 m respectively, and range is up to 11 km.

Fire control of antisubmarine weapons is accomplished with the Mk 114 and Mk 116 systems. The latter system, which uses the AN/UYK-7 computer, is the more advanced. It processes data in digital form in contrast to the analog Mk 114 system. Data enter the fire system from low-frequency shipboard sonar: from the AN/SQS-23A and B aboard the cruisers "Long Beach" and "Bainbridge" and from the AN/SQS-26 and -26CX respectively aboard "Truxton" and "California"-Class ships. The AN/SQS-53A sonar installed aboard "Virginia"-Class cruisers provides for data transmission to the Mk 116 system and is a modernized version of the AN/SQS-26 sonar. It operates in echo-ranging and passive sonar modes as well as in an underwater audio communications mode and allows for the search, classification and tracking of several targets simultaneously. The set's operating range in the active mode can be up to 18 km depending on hydrology, and from 55 to 60 km when taking advantage of conditions of superlong-range propagation of acoustic beams in convergence zones. The set is made completely of semiconductors and has an antenna array 4.8 m in diameter with 576 transducer elements located in an 11.3x6x3 m bow fairing made of reinforced sound-transparent rubber.

Gun armament is represented by the Mk 45, Mk 42 and Mk 30 127-mm general-purpose single-gun mountings (with the exception of the cruiser "Bainbridge," which has no medium caliber guns) as well as the Vulcan-Phalanx 20-mm AAA system.

Two general-purpose gun mountings each are installed aboard "Virginia"-Class and "California"-Class cruisers (Mk 45) as well as "Long Beach"-Class cruisers (Mk 30). The "Truxton" has one Mk 42 mounting.

The Mk 45 is considered the most advanced of the general-purpose gun mountings for nuclear-powered cruisers. Wide use of aluminum alloys and new grades of steel permitted reducing the weight of the Mk 45 mounting to 22.7 tons. Its design uses contactless switches, semiconductor amplifiers, electric and hydraulic interlocking devices, and modular units for rapidly detecting and remedying malfunctions. The drum-type magazine holds 20 ready-service quick-firing fixed rounds and provides for automatic fire at a rate of 20 rounds per minute with subsequent automatic replenishment of the drum by a loader, to which the projectiles (weighing 32 kg) are supplied manually. The horizontal range of fire is around 20 km and altitude range is 13.6 km.

The Mk 56 ("Long Beach"), Mk 68 ("Truxton") and Mk 86 ("Virginia"-Class and "California"-Class ships) gun fire control systems are installed aboard nuclear-powered cruisers. The systems support firing against airborne, seaborne and shore targets using radars and other technical equipment. The Mk 86 is the most advanced of the gun fire control systems. The inclusion of a computer and sets of changeable software modules in the Mk 86 permits its use in a varying tactical situation. The Mk 86 uses a tracking method which in accordance with the computer program permits tracking up to 120 targets. The computer is made of solid-state elements and has a self-monitor device and modular design, which allows rapid replacement of unserviceable units or the installation of more advanced ones. The Mk 86 system includes the AN/SPQ-9A two-dimensional pulse radar, which performs the search, classification and continuous tracking of a target. The radar has two antennas. One serves to detect surface targets and low-flying airborne targets at ranges of around 40 km and at an altitude up to 600 m. The second antenna can detect airborne targets within the limits of a vertical search angle of up to 25 degrees. The AN/SPG-60 pulse-Doppler radar performs identification and automatic tracking of airborne targets at a range of around 100 km.

Two Mk 15 Vulcan-Phalanx six-barrel 20-mm AAA systems are installed aboard each nuclear-powered guided missile cruiser for engaging airborne targets (including antiship missiles) in the near zone (rate of fire 3,000 rounds per minute, magazine capacity 950 rounds). The fire control system uses two acquisition and target tracking radars which are installed in a single unit with the mounting and operate in a pulse-Doppler mode. The radars provide for detection of a target with a radar cross-section of 0.1 m^2 at a distance up to 5 km, tracking the flights of projectiles, and automatic fire adjustment. Foreign specialists include low magazine capacity, reloading of which is done manually and takes 7-10 minutes, among the system's deficiencies.

A LAMPS system Mk 1 SH-2F helicopter is based aboard the cruiser "Truxton" (take-off weight around 6 tons, maximum speed 275 km/hr and flight range 660 km). Its main armament includes two Mk 46 torpedoes, 15 sonobuoys, the AN/ASQ-81 magnetic anomaly detector, LN66HP search radar, and AN/ALR-54 reconnaissance receiver. There is a hangar for the helicopter.

The ships' electronic equipment is distinguished by a high degree of standardization. All cruisers are outfitted with the NTDS automated system. The AN/SLQ-32(V) EW system is installed aboard the ships. It provides electronic intelligence with output of a bearing to radars (ship radars and missile homing head radars) and automatic production of target designation data for launch of a 127-mm free-flight rocket with antiradar chaff and IR decoys from four Mk 36 six-barrel launchers.

Radar equipment of the nuclear-powered cruisers includes up to 12 radars for various purposes (detection of airborne and surface targets, navigation, and fire control of missile and gun weaponry). Airborne targets are detected at a range up to 400 km, and surface targets up to 40 km. The AN/SPS-48 (3-D) and AN/SPS-40 10-cm band radars as well as the AN/SPS-49 5-cm band

radar of various modifications are used for detecting airborne targets. The LN66 as well as the AN/SPS-10, -55 and -67 radars operating in the 3-5 cm band are used for navigation and for detecting surface targets.

The electronic equipment also includes devices of the FLTSATCOM satellite communications system with the OE-82 antenna, AN/SSR-1 receiver, and 3-4 AN/WSC-3 transceivers, as well as radio communication systems on standard naval frequencies in all bands, IFF radars, TACAN radionavigation system radio beacon, and T-Mk 6 sonar countermeasures system (it is planned to replace it with the AN/SLQ-25 Nixie towed sonar countermeasures system).

All nuclear-powered cruisers (except the "Long Beach") are equipped with nuclear power plants consisting of two General Electric D2G water-cooled and water-moderated nuclear reactors and two main geared-turbine assemblies with a cumulative output of 100,000 hp. Two Westinghouse C1W nuclear reactors are installed aboard the cruiser "Long Beach" supplying steam to two main geared-turbine assemblies with a total output of 80,000 hp.

Use of the nuclear power plant introduced substantial changes to ships' architecture by permitting rejection of smoke stacks and a new approach to the design of upper superstructures with the objective of providing the most favorable operating conditions for electronic equipment. The bow superstructure of the "Long Beach," which is extended upward in the shape of a cube, and its sidewalls were used for accommodating the AN/SPS-32 and -33 radar phased antenna arrays. During major overhaul these radars were replaced with new ones, the AN/SPS-48 and -49, because of their large weight (48 and 120 tons), complexity of maintenance, and insufficient reliability. The ship's hull is not armored. The combat information center is accommodated on the fourth deck and is well protected. Usually there are 35 persons there, with their number doubled at quarters.

The large displacement, high construction cost, and complexity of design of the "Long Beach" led to a search for optimum architectural and design solutions and armament composition. Subsequently the nuclear-powered cruisers "Bainbridge" and "Truxton" were built. These ships are analogs of "Georges Leygues"-Class and "Belknap"-Class cruisers in armament and in many design features. That decision was substantiated by the desire to conduct a comparative evaluation of the effectiveness of nuclear-powered and conventional ships and assess the advantages provided by nuclear power plants. The high construction cost of nuclear-powered cruisers and lengthy time required for a detailed comparison of ship designs affected their construction rates. As a result the fourth (by count) nuclear-powered cruiser ("California") was commissioned in the United States seven years after completion of the cruiser "Truxton." "California"-Class ships reflect the development [razvitiye] level of nuclear-powered cruisers as of the early 1970's. They became the first American nuclear-powered surface ships intended for series construction.

Much attention was given in building them to standardizing constructions and increasing the degree of automation in control systems and equipment. Compared with her predecessor, the ship's displacement was increased by more than 1,300 tons because of substantially increased demands for accommodating a large volume of electronics. The cruiser became the first U.S. Navy ship armed with a surface-to-air missile with a control system based on solid-state elements and ampule batteries (they provide a reliable energy supply after a long storage period). The ship's design provides for large volume and weight reserves for subsequent modernizations. At the same time serious design shortcomings are noted which dictated a cutback of the series to two units and transition to building the next class of nuclear-powered cruisers. Foreign specialists consider one of the deficiencies of "California"-Class ships to be weak surface-to-air missile armament, represented only by two surface-to-air missile launchers. In addition, the overall composition of armament is comparable with that of conventional cruisers having considerably less displacement and construction cost. As a result the designing and then building of a new series of four "Virginia"-Class cruisers was begun.

The design of this ship embodies to the fullest extent American specialists' demands for the look of a nuclear-powered guided missile cruiser. Use of computers in designing permitted evaluating several hundred options and finding the most acceptable decision satisfying both technical as well as tactical requirements of the Navy. Elimination of the ASROC ASW missile system launcher from the armament permitted shortening the hull by 3.3 m compared with the previous design. The ship was designed as an integrated system. Attention was given above all to assuring high seaworthiness, improving habitability and organizing loading and unloading operations. Twenty to 25 sailors are accommodated in crew spaces with separate bunks, with separate spaces for resting and messing. Living units have no through passages. Plastics and continuous soundproofing of bulkheads and deckheads were widely used in finishing them. Conditions are provided aboard ship for rapidly receiving and distributing cargoes to storage areas. For this there are elevators and belt conveyors, and a through passage has been built on the starboard side on the main deck. There are two underway mobile cargo receiving stations at the forward and aft ends and one fixed station in the ship's mid-section. Stations for receiving cargoes using helicopters are equipped at the bow and stern.

Special attention in designing was given to organizing the shipboard ASU [automated control system]. The integrated centralized automated combat control system is built on the basis of seven AN/UYK-7 computers (accommodated in one space). In the opinion of foreign

specialists, that accommodation reduces the requirement for attendant personnel and facilitates arrangement for an exchange of "memory" among the computers, thus increasing the volume of data processed. The computers are used to perform calculations for subsystems controlling all kinds of weapons and to process data on the tactical situation being received over data transmission lines from other ships and shore control points. The EW system is not integrated with the automated control system; at the same time the EW system control console is located in the combat information center, which simplifies an exchange of data with the NTDS. A deficiency of the design includes the accommodation of the combat information center in the superstructure, which reduces its survivability.

One feature of the "Virginia" design, used for the first time in the U.S. Navy, was accommodation of a helicopter hangar in the afterbody beneath the upper deck. Helicopters have been removed from the ships in connection with the ships' outfitting with the Tomahawk cruise missiles (their armored launchers are installed over the former hangar). The foreign press notes that this decision reduced their ASW capabilities.

Construction of nuclear-powered guided missile cruisers is not envisaged for now under existing U.S. shipbuilding programs. Meanwhile the foreign press points out that the design of a new cruiser with the Aegis multifunction weapon system is being studied in the Navy. A combination nuclear-gas turbine power plant (CONAG) in which gas turbines are used only at full speed is being considered as its main power plant. Construction of such nuclear-powered guided missile cruisers is expected in the next decade.

Footnotes

*Because of large weight the nuclear power plant can be installed only on ships of large displacement (at least 8,000-10,000 tons)—Ed.

6904

New Japanese ASW Helicopter

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No 5, May 88 (signed to press 5 May 88) pp 57-58

[Article by Capt 1st Rank R. Fedorovich]

[Text] Japan is completing development [razrabotka] of a new ASW helicopter under the SH-X program, which has been carried out since 1983 by the Technical Research and Development Center of the Japan Defense Agency. The American SH-60B Seahawk helicopter of the LAMPS Mk III system was taken as the prototype. The new helicopter is intended for replacing the HSS-2B ASW helicopter being manufactured under U.S. license. In fiscal years 1983 and 1984 the Japanese Navy ordered two helicopters and the principal flight equipment from Sikorsky for creating [sozdaniye] prototypes. They were handed over to the Japanese Navy in 1985 and 1986 and became part of the 51st Separate Patrol (Test) Squadron. Then the test helicopters, with special Japanese-made flight equipment ordered for them (designated the XSH-60J), were transferred by the naval staff through the Technical Research and Development Center to the Japanese firm of Mitsubishi Jukogyo for final adjustment of all systems and for comprehensive tests. That firm is to completely finish the work of creating a new SH-60J ASW helicopter (see color insert [color insert not reproduced]) by the summer of 1989 together with the Technical Research and Development Center and after it is accepted in the inventory begin series production at its Komaki South plant in the city of Komaki (Aichi Prefecture).

The five-year program for building Japan's Armed Forces envisages appropriations up to 1990 for building 36 SH-60J deck-based helicopters (of which 12 already have been included in the fiscal year 1988 plan). These helicopters will begin to be delivered serially to the 21st and 22d air wings beginning in 1990 for basing aboard "Hatakaze"-Class, "Hatsuyuki"-Class, "Asagiri"-Class and other ships. On completion of transition of the Navy escort forces command authority to a new "Flotilla 8-8"* organization and establishment it is planned to bring the number of deck-based helicopters up to 48: 12 (eight organic and four reserve) in each of four squadrons (121st-124th) assigned to ships of the 1st-4th destroyer flotillas respectively. In addition, the Japanese Navy staff plans to have 54 helicopters for six shore-based helicopter squadrons (nine in each). Therefore in the 1990's it is planned to deliver a total of around 110 SH-60J helicopters. The cost of a series helicopter is estimated at 4.8 billion yen (around $35 million).

The shore-based version of the SH-60J ASW helicopter is intended for ASW warfare, reconnaissance, and issuing target designations as well as for performing search and rescue and evacuation work and accomplishing certain secondary missions. Its performance characteristics are given below.

Crew	3
Number x type gas-turbine engine (output of each, hp)	2xT700-GE-401(1700)
Weight, kg:	
Empty helicopter	6200
Take-off (depending on missions to be accomplished)	7900-9900
Flight speed, km/hr:	
Maximum	300
Cruising	250
Rate of climb at ground, m/sec	3.9-6.0
Maximum flight range, km	600
Combat radius, km	160
Maximum flight endurance, hr	4

Service ceiling, m	5700
Number of suspended fuel tanks	1-2
Maximum fuel reserve, liters	2240
Length, m:	
Overall with main rotor blades not folded	19.8
Blades folded	12.5
Fuselage (with tail boom not folded)	15.3
Width, m:	
Overall with main rotor blades folded	3.3
Fuselage	2.4
Diameter of four-bladed main rotor, m	16.4
Height, m:	
Overall with tail boom not folded	5.2
With tail boom folded	4.0
Time, minutes:	
Preflight preparation	45-52
Preparation for repeat sortie	15-17

The SH-60J helicopter can take off and land on a ship's deck with a sea state up to 5. Main armament includes two Mk 46 Mod. 5 torpedoes (maximum range 11 km). The helicopter is equipped with 25 AN/SSQ-50 sonobuoys of the active CASS system and the AN/SSQ-53 passive DIFAR system, with the AN/ASQ-81D(V) magnetic anomaly detector, the HPS-104 surface and airborne target acquisition radar and the HQS-103 dipping sonar.

Radio communications equipment includes the AN/ARS-159 radio, which provides clear and scrambled communications on 7,000 fixed frequencies (225-400 MHz) in the VHF/UHF band. The HLR-108 ELINT set, a radio receiver for operating with the AN/ARR-75 sonobuoy, as well as the HSA-118 buoy control and target distribution set also are installed in the helicopter. The AN/AYK-14 computer (65,000 machine word memory, can be increased to 96,000, weight 20.4 kg, dimensions 194x260x486 mm) supports the operation of all on-board systems.

Footnotes

*For more details see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 3, 1985, pp 49-51—Ed.

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U.S. Defense Department Expenditures for Technical Training Equipment

18010401k Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 59-63

[Article by Lt Col N. Shevchenko]

[Text] Along with the further development [razvitiye] and improvement of weapons and military equipment, serious attention is given in the Pentagon's militaristic preparations to creating [sozdaniye] (developing [razrabotka] and producing) training systems and analog systems. This is dictated by the military department's desire for a constant increase in Armed Forces combat readiness, the growth in complexity and cost of weapon systems, and the increased complexity and cost of personnel training processes.

The staff of the Under Secretary of Defense for acquisition of weapons and military equipment exercises immediate direction of the development [razrabotka] and production of technical training equipment at the Armed Forces level in coordination with corresponding agencies of the Defense Department and branches of the Armed Forces.

The work of creating [sozdaniye] simulators for various purposes is carried out both by all branches of the Armed Forces and by industry. In the process of developing [razvitiye] technical training equipment, branches of the Armed Forces work to increase the effectiveness of the personnel training process, to reduce material and financial expenditures, to create [sozdaniye] common data bases for different types of simulators and so on.

This work is financed under the Defense Department budget, approved annually by the U.S. Congress. Funds allocated to the Defense Department are distributed by principal program, specific purpose, and branches of the Armed Forces.

Funds for the development [razrabotka], procurement, maintenance and repair of technical training equipment and for building the military installations for deploying them are allocated under items of expenditure of branches of the Armed Forces: R&D; "Procurement of weapons and combat equipment"; "Combat training, personnel pay and allowances, weapons and military equipment operation and maintenance, others"; and "Military construction and housing."

In the assessments of foreign specialists, the Army plays the leading role in developing [razvitiye] training equipment. In recent years its leadership has been giving special attention to the use of simulators since without this, in the opinion of American experts, in the future Army personnel will not be able to master all the weapon systems being created [sozdavat].

Not only are modern simulators of basic weapon systems no less complex or costly than the systems which they simulate, but they even surpass such systems. For example, a simulator for training crews of the AH-64A Apache combat helicopter costs $22.5 million (the helicopter itself costs $10-12 million), but its use in the training process provides an annual saving of $8.1 million, which permits completely paying for its procurement expenses in less than three years.

The development [razrabotka] of simulators of basic weapon systems is financed within the framework of programs for creating [sozdaniye] such systems. The COFT, SFTS, ARTBASS, SIMNET, and RETS simulators, the TWGSS (Tank Weapons Gunnery Simulation System) simulator, the VIGS (Videodisk Gunnery Simulator), the MILES (Multiple Integrated Laser Engagement System) gunnery simulator and others are among the most important developments [razrabotka] of the U.S. Army (ground forces) in the field of new generation training equipment.

The COFT (Conduct Fire Trainer) electronic simulator is used for fire training of crews of M60A3, M1 and M1A1 Abrams tanks and of the M2 Bradley infantry fighting vehicle and is planned for training the crews of the M3 combat reconnaissance vehicle. It was created [sozdat] in the early 1980's by the firm of General Electric. Its development [razrabotka] cost the Army $100 million and one set costs $2.2 million.

There were $94.3 million allocated during fiscal years 1983-1987 for purchasing simulators for training the crews of M60A3 tanks. Appropriations for purchasing simulators for crews of the M1 and M1A1 tanks have been made since FY 1980. A total of $280.6 million was allocated from the Army budget for these purposes up to and including 1987. The amount of funds spent for purchasing simulators for crews of the M2 infantry fighting vehicles during fiscal years 1983-1987 was $236 million. Thus Army expenditures for purchasing the COFT simulators from FY 1983 through FY 1987 exceeded $0.5 billion.

Use of these simulators permitted the Army to substantially reduce the expenditure of material resources for tank crew combat training. Installation of one simulator set for fire training in a tank battalion permits saving $0.3 million annually just from the reduced expenditure of ammunition for 105-mm guns, and up to $2.0 million for 120-mm guns. In addition, the saving of fuel and engine life provides another $0.3 million per year. At that level of saving the expenses of acquiring the COFT simulators are repaid in one to three years. The proportion of expenditures for this type of simulator does not exceed 2 percent of the overall cost of $40 billion for programs for purchasing the M1 and M1A1 tanks, the M2 infantry fighting vehicles and the M3 combat reconnaissance vehicles.

One of the important directions for outfitting the Army with training equipment is the financing of purchases of the integrated SFTS (Synthetic Flight Training Simulator) for training the crews of AH-64A Apache and UH-60 Black Hawk helicopters. The cost of a simulator for training an AH-64A helicopter crew is $22.5 million, and for the UH-60 crew $10.6 million.

Procurements of these simulators have been financed since FY 1983. It is planned to allocate over $570 million for the acquisition of 29 simulator systems up to and including FY 1988. Of these, 15 simulators will be used for training the crews of UH-60 helicopters and 14 for the crews of AH-64A helicopters. The U.S. Army Training and Doctrine Command proposes to deliver SFTS simulators to training units and subunits in the period from 1987 through 1990.

Extensive use of simulators in the process of traininig helicopter crews leads to a considerable saving of operating costs. For example, the cost of operating simulators for training crews of the UH-60 and AH-64A helicopters is $117 and $275 per hour respectively. Operation of the real equipment is tens of times more costly: $1,500 per hour for the UH-60 helicopter and $3,700 per hour for the AH-64A helicopter.

As a result of that ratio of expenditures for operation of simulators and the real equipment, use of the UH-60 helicopter simulator permits an annual saving of $5.2 million and use of the AH-64A helicopter simulator over $8 million. Expenditures for acquisition of simulators for UH-60 helicopter crews are repaid in two years, and for AH-64A helicopter crews in less than three years. The proportion of expenditures for UH-60 and AH-64A helicopter crew training simulators is 4 percent of the cost of the procurement programs for these helicopters.

In recent years the U.S. Army command has been giving much attention to questions of creating [sozdaniye] tactical training simulators, as evidenced by the increase in expenditures for these purposes.

For example, while $82 million were allocated during fiscal years 1980-1984 for tactical simulator development [razrabotka] programs, over the succeeding five years (up to 1989) it is planned to allocate $202.3 million, i.e., 2.5 times more, for these purposes.

The ARTBASS (Army Training Battle Simulation System) and SIMNET (Simulation Networking) are the most representative programs for creating [sozdavat] tactical simulators. The former permits simulating the practice battle of ground forces to battalion level and the latter is intended for simulating the battle of tank subunits as well as for tank crew combat teamwork training.

Tactical simulators have been procured since 1981. There were $398 million spent for these purposes during fiscal years 1981-1985, and during fiscal years 1986-1989 it is planned to bring the volume of their procurements to $640 million.

The Army is building a large number of military installations for installing the simulators being acquired, for which appropriate funds are being allocated. The FY 1988 budget for the Defense Department envisages placing $97.5 million at the disposal of the U.S. Army Training and Doctrine Command.

It was planned to begin constructing a building in February 1988 for deploying COFT electronic simulators for fire training of the M3 combat reconnaissane vehicle crew. The project costs $3.4 million. Construction is being done at Fort Knox, Kentucky.

It is planned to construct a special building on the grounds of Fort Carson, Colorado where the simulator for training crews of UH-60 Black Hawk helicopters will be installed. Completion of construction is planned for 1989. The project cost is $2 million and the cost of equipment to be installed is $10.5 million.

A program for modernizing existing ranges, training fields and firing ranges and building new ones is continuing with the objective of satisfying increased troop training demands. A program begun in 1982 for modernizing U.S. Army ranges is turning into an effective system for improving weapons and simulators. There were $358 million allocated under the Army budget for building ranges in fiscal years 1984-1987.

Construction of a firing range is planned at Fort Devens, Massachusetts beginning in January 1988. It will be equipped with the RETS (Remoted Target System). The planned cost of building the range is $1.2 million.

It is planned to establish a test range at Fort McClellan, Alabama for training personnel in combat operations under urban conditions. Construction was planned to begin in February 1988 and the project cost is $3 million.

The National Training Center at Fort Irwin, California is considered an important U.S. Army personnel training installation. Its construction cost $385 million and annual operating costs beginning in 1983 have been $60-90 million. Each year new equipment is purchased for tens of millions of dollars to replace obsolete or unserviceable equipment. For example, $13.3 million were allocated in 1985 and $10.8 million in 1986 for replacement of the Center's equipment.

The use of a large number of simulators in turn requires no small operating expenditures for keeping them serviceable. Annual expenses for repair and maintenance of U.S. Army simulator equipment are $400-500 million. There were $460 million allocated under the FY 1985 budget and $507 million for FY 1987 for simulator operation. These data indicate the expanding training use of various simulators and trainers created [sozdat] on the basis of modern technology which permit a substantial increase in efficiency of personnel combat training.

The wide use of simulators of new advanced designs also is characteristic of the **Air Force**. The levels of financing developments [razrabotka] and procurements of Air Force simulators in the early 1980's reached $150 million and $1.2 billion respectively.

At the present time over 100 types of simulators, serviced by several thousand specialists, are being used for training personnel in the Air Force. Being used as the basic systems are simulators for training pilots of F-16 and F-15 tactical fighters and A-10 attack aircraft, and integrated simulator systems for training the crews of B-52 strategic bombers and heavy military transports to carry out basic flight phases, including aerial refueling from KC-135 tanker aircraft.

According to available data, the simulator which reproduces the flight and tactical employment of the F-16 tactical fighter costs $15 million; it costs almost $30 million in a set with simulation systems, with the aircraft itself costing $19 million.

Simulators for crews of F-15 tactical fighters began to be delivered in 1976. The program provided for delivery of ten such simulators. The cost of their procurement program is $200 million.

Integrated simulators which simulate flight in the B-52G heavy strategic bomber are being used for training the aircraft crews of U.S. Air Force strategic aviation. The first of them was placed in operation at Griffiss Air Force Base (New York). In the future the Air Force plans to deploy 18 such systems, which will permit saving 30,000 flying hours and over 300,000 tons of fuel per year. The cost of procuring the simulators will be $0.5 billion and the recovery period is from 3 to 6 years.

A Boeing simulator for training crews of the B-1B supersonic strategic bombers will be deployed at Dyess Air Force Base (Texas). Construction of the building for it has been under way since December 1987, and the estimated cost of the project is $3.6 million. Equipment to be installed costs another $8.3 million. Installation of the very same simulator at Ellsworth Air Force Base (South Dakota) will cost $13.7 million. The entire complex of training equipment for B-1B crews is valued at $300 million with the aircraft itself costing around $270 million.

It was planned to allocate a total of $84.3 million under the FY 1988 budget for constructing training installations just for the Air Training Command.

Much importance is attached to the creation [sozdaniye] of various simulation devices and of fixed and mobile simulators in developing [razvitiye] **Navy** training equipment. According to foreign press data, special simulators have been developed [razrabotat] for essentially all elements of combat training of surface combatants, submarines and naval aviation and for their operations as part of a force.

There were $1.3 billion allocated in the first half of the 1980's just for development [razrabotka] and procurement of simulators and trainers, and it is planned to allocate almost $3 billion in the latter half of the current decade for these purposes.

The Navy command gives principal attention to simulators for training pilots of combat aircraft such as the deck-based F-14D Tomcat fighter and the deck-based A-6F Intruder attack aircraft. The firms of McDonnell Douglas and American Aviation Industries are developing [razrabotka] simulators for crews of those aircraft. A preliminary agreement envisages the development and fabrication of four systems with delivery of the first in 1990. Over $100 million will be spent on this work. The overall cost of the contract, which provides for delivering 13 simulator systems, is over $300 million.

The Navy also is giving much attention to the development [razrabotka] and production of simulators intended for practicing navigation, piloting and dead-reckoning as well as weapon control tasks. During 1987-1989 it is planned to allocate over $300 million for R&D involving such training equipment, and around $350 million for procurements.

This branch of the Armed Forces allocates considerable sums for building training installations. Under the Navy's FY 1988 budget it is planned to allocate $144 million for these purposes just for organization of combat training.

The plans provided for beginning construction of spaces on the grounds of the Naval Training Center at Orlando, Florida in February 1988 for installing equipment and simulators of the Tomahawk cruise missiles and Mk 50 torpedoes at which launch preparation and maintenance operations will be practiced. The project is tentatively valued at $3.1 million. The simulators themselves cost $2.5 and $2.0 million respectively.

Construction of buildings for simulators of the Tomahawk cruise missile, Harpoon antiship missile and other weapon systems has been under way at the training center in San Diego, California since November 1987. Estimated cost of the project is $4.2 million. Installation of equipment is planned as early as 1988.

Construction of facilities for installing equipment for training personnel to fight fires aboard ship will begin here as well this year. The project costs $8 million and equipment procurement will require another $1.7 million.

This far from complete list of U.S. Defense Department expenditures for technical training equipment indicates the great attention being given by the Pentagon to development [razvitiye] of its training base and to development [razrabotka] of modern, advanced training equipment for it.

6904

Israel's Communication Routes and Transport

18010401l Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 63-69

[Article by Col A. Gornostalev]

[Text] The territory of Israel within the borders specified by the 1947 UN Resolution consists of 14,100 km^2, and together with lands captured during 1948-1949 it consists of over 20,700 km^2. Since 1967 Israel has occupied the West Bank of the River Jordan, including East Jerusalem, the Gaza sector and the Syrian Golan Heights—a total of 6,700 km^2. The country extends 410 km from north to south and the maximum distance from western to eastern borders is 112 km.

From the first days of the Israeli state's existence its ruling circles have attached and continue to attach great significance to the development and improvement of the infrastructure in conducting an aggressive expansionist policy with respect to neighboring Arab states. They find all possible support and assistance for this from imperialist and Zionist circles of the West, who regard Israel as a striking force against the national liberation movement in the Near East, a favorable springboard in case a conflict situation arises, and a base for attaining economic goals in the region. In accordance with the 1981 "Memorandum of Mutual Understanding," the 1983 agreement "On Strategic Cooperation" and other understandings, Israeli state figures granted the U.S. Armed Forces the right to use air and naval bases, other installations, and the territory of the country itself in crisis situations. Relations between the two countries were elevated to a qualitatively new level in 1987. Israel was granted a status equivalent to that of U.S. NATO allies in the sphere of military cooperation.

One of the principal directions of development of Israel's infrastructure is the construction and improvement of communication routes and transport on its own territory and on the Arab lands it occupies. It is the opinion of the Israeli command that rapid troop mobilization, the maneuver of personnel and equipment, and delivery of necessary supplies largely depends on the status of communication routes and uninterrupted operation of transport. Plans being developed in Tel Aviv for creating infrastructure facilities are based on an official military doctrine which envisages the conduct of a blitzkrieg against several Arab countries simultaneously, rapid troop movements between fronts, and assurance of considerable import of arms, provisions and raw materials from abroad. It is believed that motor transport must play the leading role in supporting internal transportation and sea transport in supporting external transportation. Pipelines are the principal means of delivering fuel both in peacetime and wartime. At the same time, ever growing attention is being given to rail and air transport in programs for improving the country's transportation system.

All measures involving the development and technical improvement of communication routes and transport are being carried out by agreement among military and civil agencies. The United States as well as international Zionist organizations are providing much technical and financial assistance in solving these problems. For example, in 1987 the United States alone gave Israel economic assistance amounting to $1.2 billion. It is also planned to allocate the very same sum in 1988.

Motor transport. Highways are considered the basis of Israel's internal communication routes. They interconnect all economic areas, the most important administrative-political and industrial centers, major seaports on the coast of the Mediterranean Sea and Gulf of Aqaba, airports, as well as military installations. The highway network is most developed in the central and northern areas of the country where the bulk of industrial and agricultural potential is concentrated.

The overall length of highways exceeded 13,300 km (1986 data), with an annual increase of over 200 km. There is an average of around 63 km of highways per 100 km^2 of territory. The roadway width varies from 4 to 21 m, but roads in which roadway width is 5-7 m and roadbed width is 7-10 m are the most prevalent. There are around 300 km of freeways.

The technical condition of the majority of roads is good; a well-adjusted system of their maintenance and repair is noted. Roads with asphalt concrete surface permit movement of heavy transport and combat equipment.

Motor routes run basically over level or somewhat hilly terrain on rocky plateaus and partially over the slopes of low mountains or the floor of deep depressions, and over desert and semidesert terrain. There are few mountainous sectors subject to earth creep, slides and snowdrifts. There also are no difficult extended ascents and descents or high-mountain passes.

The bulk of highway bridges are over streams and small rivers that dry up in summer as well as over depressions.

Maximum permissible transport speed on main roads reaches 80-120 km/hr depending on their condition, and on other roads 50-80 km/hr.

Among highway routes of greatest military significance Israeli specialists include the roads extending from north to south from the borders of Syria and Lebanon to the Egyptian border and the Israeli port of Elat on the coast of the Gulf of Aqaba in the Red Sea (Fig. 1). They run through important economic areas and centers and intersect main routes running from west to east from the Mediterranean coast to the borders of Jordan and further into the interior of the Arabian Peninsula.

The route originating at the Lebanese border and running through the cities of Nahariyya-Haifa-Hadera-Petah Tiqwa-Tel Aviv-Ramla-Qiryat Gat-Beersheba-Dimona and further to Elat is considered an important link in the highway system. This route is duplicated for a considerable stretch along the Mediterranean coast by another: Haifa-Tel Aviv-Ashqelon-Gaza. The main route is around 480 km long and the parallel route is 220 km long.

The following roads run from west to east: Akko-Zefat-Rosh Pinna at the Syrian border (around 83 km long); Haifa-Nazareth-Tiberias (70 km); Tel Aviv-Ramla-Jerusalem (61 km); Ashqelon-Jerusalem (85 km); Gaza-Beersheba-Dimona-Sedom (132 km).

Modern high-speed multilane main highways with asphalt concrete surface are laid from Tel Aviv to Haifa (97 km) and from Tel Aviv to Jerusalem (61 km).

Highways are presently being built on occupied Arab territories.

Great importance is attached to increasing the number of motor vehicles, especiallly heavy-freight vehicles. Israel presently has a large pool of motor transport equipment for the scale of the country which numbered over 776,000 in 1986 including around 600,000 passenger vehicles, almost 115,000 trucks and 8,500 buses. According to Israeli press data the average length of a motor vehicle's operation is a little over five years. Vehicles with a load capacity of from 3 to 20 tons predominate among trucks.

According to assessments of foreign specialists, Israel's **rail transport** is insufficiently developed and accounts for only around 20 percent of overall freight and passenger transportation. The length of main railroads in 1987 was over 520 km (830 km including non-main railroads). The track gauge is 1,435 mm and the average density of railroads is 4.1 km per 100 km^2. As a rule railroads are single-track.

This form of transportation basically is developed in the central areas, less so in the northern part of the country, and is essentially absent in the south. The main railroad runs from the Lebanese border through the cities of Haifa, Lod and further on to El-Arish (Egypt). Other railroad routes are Ramla-Qiryat Gat-Beersheba-Dimona-Oron (120 km); Tel Aviv-Ramla-Bet Shemesh-Jerusalem (70 km); Haifa-Afula-Sama (100 km; from Afula a spur goes to Nabulus); Tel Aviv-Hadera, and further on until it joins the main railroad (75 km).

According to foreign press reports the technical condition of the railroad bed is poor: minimum curve radii are up to 140 m and light rails of two types are laid on the greater part of the tracks—39.24 kg per running meter and 46.3 kg per running meter. Maximum permissible speed of freight trains on such roads is 60 km/hr and that of passenger trains 80 km/hr; maximum weight of freight

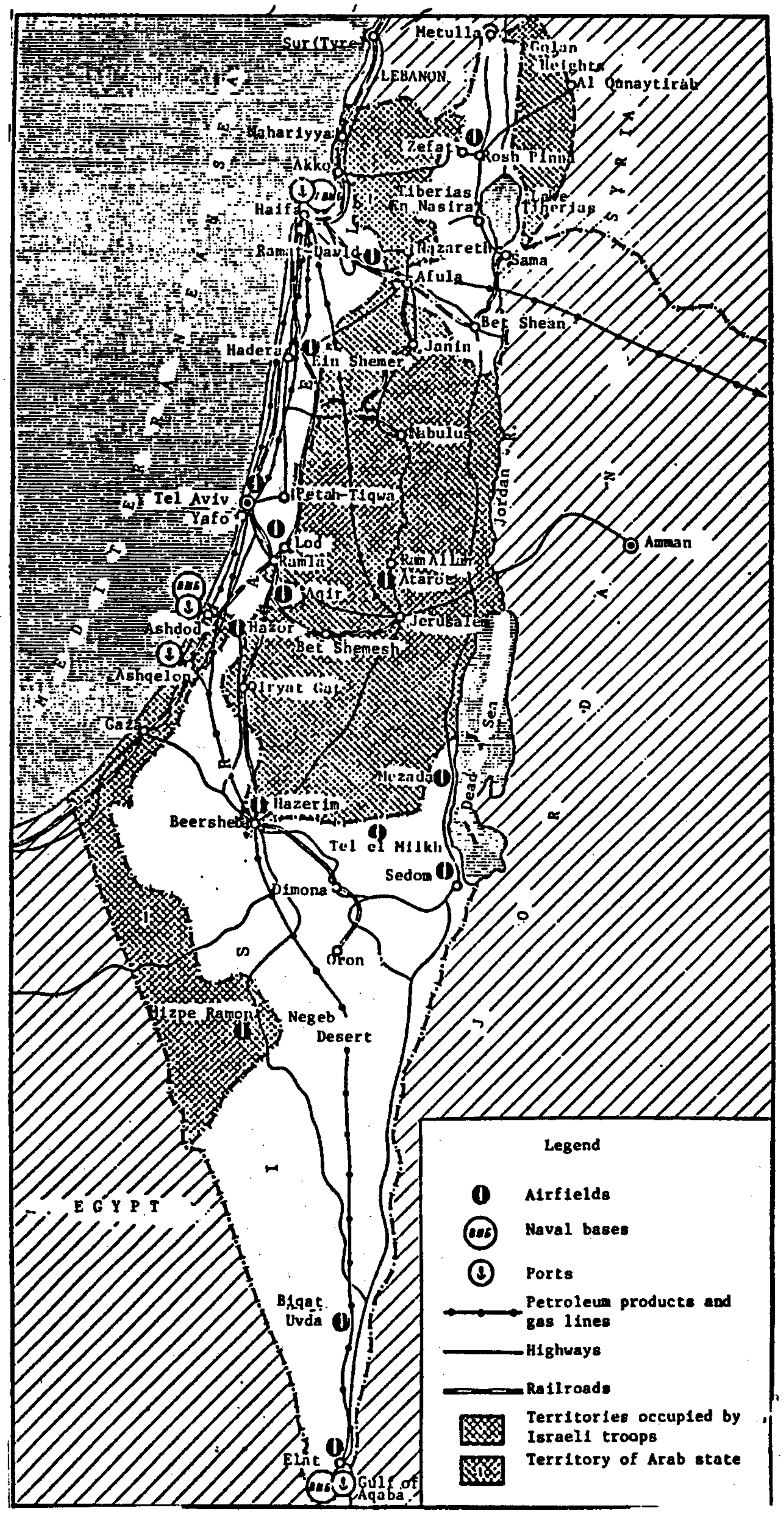

Fig. 1. Map of main transportation routes on the territory of Israel and on Arab lands it occupies (borders of the state of Israel shown in accordance with UN General Assembly Resolution of 29 November 1947)

trains is 1,500 tons and that of passenger trains 600 tons. Train traffic at a speed of up to 90 km/hr is permitted on the fast Tel Aviv-Haifa and Tel Aviv-Jerusalem main rail lines.

Work is presently under way to modernize the rolling stock, which numbers around 60 diesel locomotives and almost 2,000 cars of various types. It is planned to considerably replenish the rolling stock, above all with cars for bulk freight (grain, phosphates, potash) as well as with fuel tank cars.

The general plan for railroad development up to the year 2000 calls for creating a main route running from the northern part of the country through the Negeb Desert to the port of Elat, building a second route in the Tel Aviv-Haifa sector, renovating the Tel Aviv-Jerusalem line running through Lod, and modernizing the sector of the Hijaz railroad running from Haifa to the eastern part of the country.

Foreign specialists note that the closed nature of the Israeli highway and railroad systems is a characteristic feature. They do not have existing egress to neighboring countries and are not linked with them by transportation systems. Meanwhile the Israelis have carried out significant measures to build individual sectors of roads which allowed tying the highway systems of the country and of Arab territories it occupies into a single entity and thus linking military, industrial and militarized installations established on the occupied territories with main highways. As result of these measures a unified road-transport system of Israel and of its occupied Arab territories has been created which can be used for military purposes. The number of "north-south" through routes has been increased and routes running from west to east lengthened, which in the opinion of western military specialists considerably increased the survivability of the entire highway system and capabilities for maneuver of personnel and equipment. The most important transportation centers are Tel Aviv, Haifa, Jerusalem, Beersheba, Ashdod, Ashqelon and Elat, through which essentially all communication routes run.

Sea transport. The role and importance of sea transport for the country's economy are predetermined largely by the direction of foreign trade, in which the United States, states of Western Europe, and Japan play the dominant role. All seaports are under the purview of a unified state administration in Tel Aviv. According to foreign press data, the freight turnover of seaports in 1986 was 17.6 million tons.

Haifa is the main naval base and most important port. The bulk of naval ships are serviced there and principal imported cargoes pass through it. The port is situated on the banks of a bay by the same name. Its water area is protected from the sea by two breakwaters 3,426 m and 765 m long with a passage 183 m wide between them. Berths with depths at the wall to 11.5 m are situated in the southern part of the port and a new container and freight terminal (Fig. 2 [figure not reproduced]) 450 m long with depths at the wall of around 13.5 m has been placed in operation in the eastern part. Eighteen freight storage sheds with a total area of 100,000 m^2 have been built and areas have been equipped for open freight storage (216,000 m^2). There are 26 cranes with a lifting capacity of from 3 to 100 tons for loading and unloading operations. A railroad has been brought up to the port. Its annual throughput is around 5 million tons of freight (not counting bulk liquid freight).

Ashdod is the principal deep-water export port. The manmade bay where it is located is protected from the sea by two breakwaters 2,200 m and 900 m long with a passage 250 m wide between them. Depths in the entrance channel exceed 11 m. Ten berths with an overall length of 3,500 m have been built here, including over 450 m assigned to the container terminal and served by two cranes. Twelve storage areas and two open areas (67,000 m^2) have been built for accommodating freight. Loading and unloading operations are supported by 33 cranes with a lifting capacity up to 45 tons. The port's annual freight turnover is over 7 million tons (excluding bulk liquid freight). The future port development plan provides for building a terminal for receiving grain, increasing capacities for transshipment of containers to 140,000 items per year, and allowing coal freighters with a deadweight up to 160,000 tons to be received.

Crude oil is re-exported through the port of Ashqelon situated 16 km south of the port of Ashdod. Five roadstead anchorages where the depth reaches 24 m and one where the depth reaches 31 m have been prepared in Ashqelon. There are mooring buoys to which underwater pipelines are led. The terminal permits receiving tankers with a deadweight of over 100,000 tons.

The southernmost port of Elat (freight turnover around 1 million tons per year) presents the only opportunity for egress to the Red Sea bypassing the Suez Canal and supports freight shipments to Africa and Asia. Twelve roadstead anchorages have been prepared in the northern part of the port's water area. Berths with an overall length of around 530 m with depths at the wall of 11.5 m are built in the southwestern part, and oil-loading terminals supporting the receipt of supertankers with a deadweight up to 500,000 tons are situated in the southern part. Open areas with an overall 20,000 m^2 have been prepared in the port for storing freight. Loading and unloading operations are supported by 18 cranes.

Israel's merchant fleet numbered around 80 vessels (deadweight 2.8 million tons) in 1986, including almost 50 cargo vessels. In addition a significant number of Israeli vessels participated in sea transportation under foreign flags.

All sea transportation is accomplished by national shipping companies, which also widely use the vessels of foreign firms. The largest national shipping company—ZIM Israeli Navigation—has almost half of the overall tonnage of Israeli maritime transport vessels.

According to Israeli press reports, one of the tasks which **air transport** must accomplish is to ensure that air communication routes are constantly ready to accomplish urgent domestic and foreign transportation with consideration of armed forces' interests. This was repeatedly and clearly confirmed during the Arab-Israeli wars.

Because of geographic conditions and preferential use of motor transport, air traffic within the country was of secondary importance up to 1970, but after occupation of Arab territories the role of local air routes rose considerably. Regular domestic flights are made between such important centers as Tel Aviv, Haifa, Jerusalem, Beersheba and Elat. This transportation is accomplished basically by the Arkia Private Airline company. A total of around 1.5 million passengers was carried in 1986.

International air routes are served by the El Al Israeli state airline company, established in 1948. Its aircraft inventory numbers around 20 modern American-made Boeing 707, 737 and 747 airliners. In addition, the KAL private airline company, established in 1976, delivers freight between Israel and countries of Western Europe. Israeli companies carried over 3.1 million passengers and around 150,000 tons of freight on international air routes in 1985.

In accordance with a 1977 law an airport administration was established in the country which has charge of construction and operation of airfields. The largest airfields are located in the vicinity of the populated points of Lod, Biqat Uvda, Mizpe Ramon, Tel el-Milkh, Aqir, Ramat-David, Hazerim, Hazor, Jerusalem, Elat and others. They are used both by the Air Force and by civil aviation (see table).

It is expected that by the year 2000 passenger transportation by Israeli air transport will increase to 20 million persons per year.

Pipeline transport. The transportation of general-purpose oil products over the territory of Israel and in the occupied Arab territories is accomplished in rail and motor transport tank cars and over pipelines.

A network of military main oil pipelines linking oil refineries in the cities of Haifa and Ashdod with the most important military oil storage areas was established to support the needs of the armed forces. Pipelines have been laid from them to the most important air bases and locations of armored units. In addition to main pumping stations, reserve pumping stations also have been built along the pipeline routes.

General-purpose oil lines also have been built in the country for pumping oil from oilfields and unloading ports to loading ports and oil refineries, and a special oil line has been built for re-export of oil bypassing the Suez Canal. Their total length is around 1,200 km and the throughput is up to 50 million tons of oil a year. The

Description of Main Airfields

Airfield	Coordinates				Elevation Above Sea Level, m	Main Runway*	
	North Latitude		East Longitude			Dimensions, m	Runway Heading, degrees
Aqir	32°	00'	34°	50'	50	2400 x 45	00 — 180
Ein Shemer	32	26	35	00	30	1566 x 45	100 — 280
Biqat Uvda	29	57	34	56	465	2992 x 45	20 — 200
Jerusalem	31	52	35	13	745	1960 x 45	120 — 300
Lod	32	00	34	53	35	3647 x 45	80 — 260
Mizpe Ramon	30	47	34	40	660	3000 x 45	70 — 250
Mezada	31	19	35	23	390	1196 x 30	10 — 190
Ramat-David	32	40	35	11	50	2600 x 50	90 — 270
Rosh Pinna	32	58	35	34	265	1097 x 30	50 — 230
Tel Aviv	32	06	34	46	10	1739 x 30	30 — 210
Sedom	31	10	35	22	385	900 x 35	140 — 320
Tel el Milkh	31	12	35	01	385	3300 x 45	80 — 260
Haifa	32	48	35	02	10	1271 x 30	160 — 340
Hazerim	31	15	34	40	205	2400 x 50	100 — 280
Hazor	31	46	34	44	60	2500 x 45	110 — 290
Elat	29	33	34	57	5	1895 x 30	30 — 210

*Main runway at all airfields has asphalt concrete surface.

following are among the general-purpose oil lines. Elat-Haifa is 418 km long, pipe diameter 400 mm, throughput around 2.9 million tons per year. This first (according to construction time) Israeli oil line is intended for pumping crude oil to the Haifa oil refinery. Elat-Ashqelon began operation in 1970 and is used for re-exporting oil. It is 320 km long, pipe diameter is 1,050 mm, and throughput is up to 40 million tons per year. The Haifa-Ashdod pipeline was built to transport oil products to the port and to enterprises of the cities of Ashdod and Tel Aviv, and to transport crude oil pumped from Ashqelon in the reverse direction. Haifa-Jerusalem (built in 1972) serves for transporting oil products to Jerusalem. The throughput is 100,000 tons per year. The Kirkuk (Iraq)-Haifa oil line presently is mothballed.

Natural gas fields and refineries are linked with principal consumers by several low-capacity gas lines.

One of the important and difficult problems for the Israeli economy is to provide water to the residents of cities and populated points and supply it to industrial enterprises and agricultural areas, especially in the southern part of the country. Artesian wells and Lake Tiberias serve as the principal water sources.

The entire water supply system is under control of the state, which constructs and operates water lines, pumping stations and water reservoirs; establishes irrigation systems; and accounts for water consumption and distribution. The Lake Tiberias-Negeb Desert water line extending around 250 km and with a throughput of over 340 million m^3 per year was built to provide a centralized water supply system in Israel. The set of its facilities includes open canals, underground tunnels, pipelines (pipes with a diameter of from 1,676 to 2,743 mm), pumping stations and water reservoirs. Pipelines of local importance over which water is supplied to consumers are connected to the main water line. Work to lay water lines to major populated points has been performed at accelerated rates in recent years. Pipes of various materials with a diameter of from 51 to 305 mm and sometimes even larger have been used.

On the whole, measures taken by the Israeli leadership to develop the national infrastructure and captured Arab lands, including communication routes and transport, attest to Tel Aviv's expansionist plans aimed at perpetuating the occupation. Relying on comprehensive U.S. support, Israel is conducting a planned colonization of occupied Arab territories.

6904

From Remedying to Preventing Defects

18010401m Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 5, May 88 (signed to press 5 May 88) pp 69-73

[Article by G. Gornastayev, candidate of economic sciences: "From Remedying to Preventing Defects (Measures to Improve Reliability of American Military Products)"]

[Text] The increasing complexity of weapons of warfare and the inadequacy of the weapon and military equipment quality assurance system which took shape by the early 1980's to the degree of their development [razvitiye] led to increased instances of the output of defective military products in the United States. As a result some American specialists believe that around 15 percent (in cost) of all weapons purchased either began to be turned into scrap or was returned to contractors for remedying the identified deficiencies.

The costs for alteration and repair in many companies reached 25-30 percent of the cost of manufactured military products. The volume of these expenditures not only remained at a high level, but even increased. Labor inputs rose considerably. The labor-intensiveness of a large number of assemblies and components for military purposes exceeded normative labor-intensiveness by 2-3 times.

Additional time was required to remedy defects, and this led to an increase in production periods. For example, in the first half of the 1980's the Department of the Air Force identified a noticeable increase in length of production of aircraft-missile and space equipment by such very large contractors as Boeing, General Dynamics, Raytheon, Hughes Aircraft, and United Technologies.

The drop in quality of weapon and military equipment components and assemblies being manufactured in the final account affected their reliability. Unserviceable assemblies were found in the Phoenix, Maverick and Sidewinder guided missiles, the TOW-2 ATGM, and F-18 aircraft engines. Just since the beginning of 1986 there have been explosions of the Challenger space shuttle and Titan-34D and Atlas-Centaur booster rockets, as well as an accident with a medium-range Pershing-II missile stationed on FRG territory.

To this must be added that expanded use of military robot automated control systems presumes the transfer of an ever-increasing number of control functions to them. Surprise, unpredictability and the transient nature of possible combat operations demand an increase in combat readiness of weapon systems. All this in the final account sharply increases the "price" of failures, which is determined not so much by expenditures for remedying particular defects as by the consequences which an accident or failure may entail.

Under these conditions the military department undertook to increase the rigidity of sanctions against violators of the quality norms it establishes. In the first half of the 1980's such measures as performing a selective check disassembly of articles which had undergone a complete cycle of tests and inspections, suspending the output of defective components and current payments, and so on began to be taken. The change in government policy in the sphere of military product quality also showed up in regular public announcements about contractors who put out poor quality articles.

The growing frequency of instances of the production of defective military products aggravated the problem of quality of military articles. The opinion formed both in military-industrial companies and in the state apparatus that this question was impossible to resolve only by increasing the number of inspectors and making the inspection process itself more rigid. In the opinion of the majority of American specialists, in the past that approach usually led to a noticeable increase in cost of articles and only to a slight increase in their quality. By the mid-1980's the need for **preventing** deviations from the requisite quality level and not **identifying and remedying** them during inspection, especially in the final stage of creating [sozdaniye] a product, became especially apparent.

Under conditions where state agencies began to increase their demands on quality of manufactured military products and the increase in production defects required contractors to make additional expenditures for alteration and repair, some American companies began to shift from quality control to a system of measures of a preventive nature which prevent the possibility of the appearance of failures. For several years now that approach has been used by a large number of companies, especially Japanese, in manufacturing civilian equipment. Around 75 percent of quality assurance measures are taken in the stages of searching for circuit and design solutions, planning, working out prototypes, finishing test articles and debugging technology; 20 percent in the stage of control of technological processes; and only 5 percent comprises strictly technical control of product quality.

An important feature of that approach is the elaboration of instructions based on quality requirements for performing all kinds of jobs—planning, production, testing—as well as increased rigidity of control of technological processes. Deficiencies not identified in the stage of creating [sozdaniye] the product are analyzed and ways of remedying them are chosen without fail in the operating phase. Accumulated experience is studied and requirements identified for new means of improving quality, including the creation [sozdaniye] of more advanced automated production equipment.

And so the process of forming quality extends to an enterprise's entire production-economic activity; essentially all functional subunits of a firm as well as almost all its personnel must take part in it. A quality improvement control staff is formed accordingly; as experience has shown, it must be independent of a company's production subunits.

Leading American scientists note that only 15-20 percent of problems connected with production defects arise through the fault of the immediate performers and 80-85 percent arise for reasons for which higher leadership is responsible. A typical Japanese company usually has a *quality improvement committee* headed by one of the general managers (its members are the heads of all functional services). The *quality control department* is the executive body of this committee. In the United States the contribution of higher managers to solving quality improvement problems is less significant.

Some American military-industrial companies have begun to involve their associates in the process of discussing plans for innovations and to include their representatives in "development groups." **Quality circles*** have become widespread. At the present time they exist in enterprises of such very large Pentagon contractors as Boeing, Westinghouse, General Electric, International Business Machines (IBM), International Telephone and Telegraph (ITT), Lockheed, and McDonnell Douglas. They appeared for the first time in the United States in 1974, and according to some estimates their number reached 95,000 by the end of 1984. True, in comparison with Japan the proportion of worker and employee involvement here is small, only 10 percent.

Quality circles work on these problems at the shop level, within limits of workers' competence, passing on more complex problems to specialists and managers. This limitation is overcome by joining circles into **working centers** at enterprise level. Thus innovation by associates of military-industrial firms becomes an essential part of the process of improving the quality of manufactured products and intensifying production.

Prompt material incentives for personnel and the broad, regular popularization of individual achievements play a noticeable role in activating their initiative.

Effective work of the circles would be impossible without the desire of the workers and employees themselves to take part in them. This desire is explained by the fact that the circles give people an incentive for active, creative work and make daily monotonous work more interesting and meaningful, and the real improvements in the labor process achieved through their own efforts increase satisfaction in labor results.

The involvement of firms' associates in the process of improving quality required a restructuring of their professional training. In connection with this many military-industrial companies began to organize special courses for increasing qualifications. Special attention is given to regularity of training. This is explained above all by rapid development [razvitiye] of production and

control equipment. The most important training objectives are to develop in students an awareness of the need for improving product quality and reliability and to encourage responsibility for high quality throughout all phases of the creation [sozdaniye] of articles. The use of visual training equipment including diagrams, slides and movies facilitates good perception. The most important training features are a constant improvement in the forms in which material is presented and its prompt updating with consideration of new directions for improving quality of manufactured products. For example, over a period of three years (1987-1990) 2,300 managers of the firm of RCA, which held 23d place among Pentagon contractors in FY 1985, are to undergo training at five-day quality courses. Last year the company was planning to open similar courses for the other associates, i.e., workers, technicians and engineers.

Training is carried out both in general theoretical disciplines and in applied, specialized subjects. General theoretical disciplines are chosen so that trainees are able to effectively apply the knowledge received to specific areas or objects of their labor. Specialized training at the level of a firm's department or a group helps students identify routine quality violations and rapidly master foremost methods of preventing and remedying them. Training topics for example touch on ways of improving production processes, data system capabilities, advantages of contemporary and future quality control equipment, and features of new standards and specifications.

Thus, as the American press notes, in the first half of the 1980's on the one hand there was an aggravation of military equipment quality problems, and on the other hand a large number of Pentagon contractor firms had accumulated specific experience in integrating the processes of development [razrabotka], production and product quality improvement, as well as the use of their associates' intellectual capacities for reducing the number of defects. Along with developing in workers a joint responsibility with the administration for the company's success by involving them in innovative work and meetings of a firm's heads with associates, the programs for unifying the development [razrabotka], production, testing and quality improvement processes in the mid-1980's began to be viewed by the overwhelming majority of American military-industrial firms not as an experiment, but as a purposeful course. These programs are becoming a subject of contract relations with trade unions and a means of turning them into partners in solving problems of improving the quality of manufactured products and problems of production intensification as a whole. Specialists note that quality improvement leads to a growth in effectiveness of the process of creating [sozdaniye] weapons and military equipment.

It should not be thought, however, that all Pentagon contractors achieved significant success. Among them are both acknowledged leaders as well as laggards, but the majority of military product suppliers are between them, according to American press data.

With the concept's obvious simplicity, the introduction of quality circles is not going smoothly and there are frequent breakdowns and failures. For example, only one out of seven attempts to organize such circles in the United States ends in success. Only a fourth of them provide a saving, while results of the work of half of the circles only cover expenses of their establishment and financing.

It also must be noted that quality circles are not a panacea for all troubles, let alone a ready-made "success formula." They can operate effectively only if they are part of a comprehensive quality control system.

Under these conditions the U.S. Defense Department adopted a special **military product quality improvement program** in the mid-1980's. It consists of ten points and provides above all for an expansion in the unification of R&D and production with the process of product quality improvement for strengthening technological discipline during the creation [sozdaniye] of weapons and military equipment.

The U.S. Defense Department is also trying to stimulate the work of its contractors in solving quality problems. In particular this is evidenced by a provision of the program that in the competitive letting of contracts the military department must take into account the experience of claimants in solving problems of reducing production defects as well.

In addition it is planned to eliminate excessive requirements on contracts which not only lead to considerable additional expenses but at times even hamper contractors' work for the purpose of reducing the amount of incomplete work. In other words, back in an early stage of creating [sozdaniye] arms, it is planned to discuss above all what performance characteristics the system being ordered must have and to reduce Defense Department requirements on the methods by which a contractor is to achieve these characteristics. Former U.S. Secretary of Defense C. Weinberger noted that a comparative analysis of expenses and the resulting effect must be fundamental in choosing the requirements to be included in a contract for particular military equipment.

In this regard the U.S. Defense Department program also provides for reducing the number of military standards and specifications. Much already has been done in this direction. For example, 45,000 complex military standards and specifications which contractors previously were to consider in preparing a competitive project for obtaining an order were replaced by a reference convenient to use consisting of a total of 14 sections. The number of standards for reliability and repairability of electronic devices, for example, was cut from 57 to 7. As a result the time needed for preparing those competitive projects was reduced from several months to several weeks, and in some cases even several days.

Comprehensive automation and mechanization of technological processes also placed tasks of automating measurements and control and test operations on the agenda. The amount of funds allocated by some firms for these purposes reaches 35 percent of annual expenses for production equipment. Not all Pentagon contractors, however, willingly undertake to increase expenditures for quality control equipment. In this regard under the above program the U.S. Defense Department plans to broaden its participation in modernizing quality control equipment at its contractor enterprises.

The state program for improving the quality of military products speaks of the need to generalize the experience of quality circles already existing at enterprises of some military-industrial companies. It is also proposed to increase the incentive of Pentagon contractor firm associates for reducing the number of production defects by allocating to them a certain portion of additional profit which may appear as a result of reduced expenditures for alterations, scrap, and spare parts. The Defense Department undertook to establish quality circles within its own department as well. In particular, in early 1987 the departments of Army and Air Force already had four such circles each. Members of these circles (servicemen and civilian personnel) also receive remunerations for suggestions which lead to reduced expenditures.

The above program sets the task of expanding and improving the professional training of associates both of contracting firms and of Defense Department procurement agencies. In 1985 the U.S. Congress passed a special law under which all heads of programs for creating [sozdaniye] weapons and military equipment must complete a 20-week training course at the U.S. Industrial College of the Armed Forces (in which civilian specialists also train along with officers) or have a diploma of completion of similar courses. As a result in four years (from 1987 through 1990) the number of students at this college should double. It also approximately doubled over the preceding four years, reaching almost 3,500 persons in early 1987. The U.S. Defense Department also is considering the question of establishing a special university which would train cadres of higher qualification for procurement agencies.

The military department gives assistance to its contractors in training specialists to manage programs for creating [sozdaniye] arms. For example, at the present time representatives of military-industrial companies account for approximately a tenth of students at the aforementioned Industrial College of the Armed Forces.

In addition the program envisages developing a system of guarantees which would free Defense Department contractors of receiving poor-quality materials and assemblies and would reinforce the supervision of general contractors over subcontractors and suppliers.

The program poses tasks of intensifying quality control of military products and rigidifying investigations of instances of abuse and fraud.

This state program for improving the quality of military products indicates that the U.S. Defense Department is attempting to solve the problem of reducing the number of defects of military products by extending the process of quality improvement to all its contractor activities including development [razrabotka], planning and production; making wide use of intellectual capacities of associates both of military-industrial companies and of state agencies; giving contractors and subcontractors increased responsibility and granting them greater independence; and assisting arms suppliers in adopting new technical quality control equipment and giving them incentives in the work of modernizing their production facility. Here the military department is attempting to use economic management methods above all.

Measures taken both by Pentagon contractors and by state agencies are producing certain results. For example, they permitted the Aerospace and Defense Division of Honeywell to reduce by over half the proportion of alterations and scrap in overall product sales from 1980 through 1984. While before the beginning of the quality program only 48 percent of processors put out by RCA for the Aegis shipboard multifunction weapon system met established requirements, that proportion rose to 98 percent after its realization. As a result, expenditures for each system were cut by approximately $50,000. One other quality program permitted RCA to lower the proportion of rejects in materials it was receiving from 9 percent in 1979 to 4 percent in 1984 and to save approximately $1.5 million because of this.

One should not absolutize the American practice of quality improvement of military products and think that the overwhelming majority of Pentagon contractors and subcontractors work well. To the contrary, statistics show that there are not so many instances of a significant reduction in the number of defects of military products. This problem continues to be rather acute. As emphasized by U.S. Air Force Deputy Chief of Staff Gen John Piotrowski, American contractors still supply the Defense Department with articles inferior in quality to industrial goods for civilian purposes. While the United States will continue creating [sozdaniye] a new generation of very sophisticated kinds of weapons, it will have to come to grips with the enormous and difficult job of improving the quality and reliability of their assemblies and set-completing parts. This also is connected with the fact that there will be a sharp increase in the "price" of possible accidents and failures.

Footnotes

*A quality circle is a small group of workers or employees (from 3 to 12 persons) who meet regularly (usually once a week) for an hour during work time or nonworking time, discuss production problems, collectively make

decisions and subsequently implement them themselves. These circles appeared in Japan in 1962. Initially organized in production shops, lately they have spread to the work of communications and transport services and logistic departments. Quality circles also have widely penetrated banking, municipal services and public dining—Author.

6904

Restoration of Runways at Royal Air Force Airfields

18010401n Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) pp 73-74

[Article by Col V. Cheremushkin]

[Text] Simultaneously with a build-up in combat power of air forces, the leadership of the North Atlantic Alliance and of states belonging to it is taking measures to improve survivability of aviation equipment and control points and to protect flight and engineering-technical personnel at airfields. In particular, under a program for developing NATO's military infrastructure the creation [sozdaniye] of over 600 reinforced concrete aircraft shelters should be completed by 1990. U.S. Air Force construction of fixed shelters (a total of 1,700) for protecting personnel both against conventional weapons and against weapons of mass destruction has been under way since 1986 at air bases outside the continental United States. In addition, sets of mobile (vehicular) airfield equipment are being developed [razrabatyvayutsya] for replacing fixed equipment in case it is knocked out from enemy action.

Foreign military specialists believe that under these conditions the runway remains the most vulnerable when a strike is delivered against an airfield by conventional weapons: for example, craters with a diameter up to 20 m and a depth of around 4 m may form on it as a result of bombing strikes. Therefore in recent years increasingly serious attention has been given to questions of restoring runways at air bases and airfields of air forces of principal NATO countries. For example, since the beginning of the current decade the United States has been carrying out a comprehensive program called RRR (Rapid Runway Repair) to work out the most optimum methods of repairing damaged runways. Similar programs also exist in other NATO countries.

The Royal Air Force adopted two basic methods of restoring runways. The first consists of removing the surface heaved up along the crater edges, its remnants, and loosened soil from the crater itself. The hole is filled by large crushed stone 25-30 mm in size, and smaller crushed stone (to 10 mm) is spread on top for leveling. Then a metal ADR (Airfield Damage Repair, see figure [figure not reproduced]) mat is laid down and fastened to the undamaged concrete surface.

In restoring runways under the second method the heaved crater edges are cut off and a bulldozer uses them as well as other fragments to fill the hole. Large crushed stone also is added. Everything is tamped by a 5-ton load dropped by a hoisting crane (excavation crane) and then the ADR mat is laid down as in the first instance. This method is faster and less labor-intensive, but British specialists still prefer the first method since there is minimum settling of soil from the load of a moving aircraft.

Reserves of crushed stone are established at airfields with the objective of ensuring rapid repair and restoration work, and appropriate technical resources are provided. Considering the fact that trucks engaged in transporting crushed stone will be making trips entirely over a level field it is recommended having materials to build up the sides of truck bodies. This permits increasing load-carrying capacity by approximately 25 percent.

Special two-man teams repair small potholes. Each team has a small portable concrete mixer. One 4-ton vehicle is assigned to four teams. The team loads the concrete mixer with a special resin and powdered filler right at the pothole to be filled. Everything is mixed and the mixture put in place. Its complete hardening* occurs in 30 minutes; according to the technology, no more mixture (in volume) than twice the capacity of the concrete mixer should be placed in one hole.

Tasks of restoring runways in Great Britain are assigned in particular to the 39th Engineer Regiment (stationed in Waterbeach, Cambridgeshire County). It includes a field engineer battalion, two airfield construction battalions and a field support battalion. In addition, in case of war two more construction battalions (one each from two engineer regiments) will become subordinate to the regiment. In the opinion of the British command, this will permit more effective use of personnel and equipment.

Above all this regiment is responsible for repairing runways of Royal Air Force base airfields in the FRG (air bases of Guetersloh, Brueggen, Laarbruch and Wildenrat). Each battalion has the necessary supplies warehoused in advanced at the appropriate airfield to improve readiness of performing missions in a combat situation and to reduce time of performing the work. The Air Force command believes that the regiment must ensure normal functioning of at least one airfield with appropriate illumination-engineering equipment, a supply of electrical power and water, and so on for friendly aircraft in the FRG.

Problems of organizing and restoring runways are practiced by engineer subunits while performing similar jobs in the interests of civilian departments and Armed Forces both in the country and abroad. In addition,

attention is given to this at special exercises organized annually on the territory of the FRG, usually against an appropriate tactical background. During one such exercise craters were made on the flying field, fragments of runway surface were scattered, and means of simulation were used—unexploded projectiles and bombs, antipersonnel mines and chemical charges. Before the beginning of work engineer reconnaissance was performed in two helicopters to determine the scale of damage and select those sectors which if repaired would ensure restoration of a runway of the minimum necessary length. Engineer subunits also organized ground reconnaissance (the groups included specially trained combat engineers) with the objective of clarifying ground transport movement routes and clearing mines from the terrain. One hundred fifty combat engineers filled in three craters and 18 teams filled in small potholes at the same time. All personnel operated in protective masks and protective clothing.

Footnotes

*The term signifies the formation of polymers of three-dimensional structure out of polymers with low molecular weight or polymers of linear or developed structure, as a result of which their capability of dissolving and melting during heating is lost.

6904

U.S. 1st, 3d Armored Divisions

18010401o Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) p 75

[Article by Lt Col I. Aleksandrov]

[Text] Reorganization of the regular Army's 1st and 3d armored divisions, which are part of the U.S. Army grouping in the European zone, is being completed in the course of implementation of the "Army-90" long-term program for organizational development of the ground forces. The objective of the measures being taken is to increase the divisions' fire and striking power, tactical mobility, and capability of conducting lengthy combat operations.

The 1st Armored Division (emblem shown in Fig. 1 [figure not reproduced]) is stationed in the FRG (headquarters at Ansbach) and is intended for operations as part of the VII Army Corps. The 3d Armored Division (Fig. 2 [figure not reproduced]) is also stationed in the FRG (headquarters in Frankfurt am Main), it is part of the V Army Corps and is intended for accomplishing missions as part of the Corps.

Organizationally each of the divisions will include a headquarters and headquarters company, three brigade headquarters, six tank battalions, four mechanized battalions, division artillery[1] (a battery of MLRS and three 155-mm self-propelled howitzer battalions), army aviation brigade, antiaircraft battalion, reconnaissance battalion, EW battalion, communications battalion, engineer battalion, division support command, as well as a military police company and company for defense against mass destruction weapons. They each have a total of 19,274 persons,[2] 72 155-mm self-propelled howitzers, 9 MLRS launchers, 348 M1 Abrams tanks, 216 M2 Bradley infantry fighting vehicles, 118 M3 combat reconnaissance vehicles, 168 M577A1 command and staff vehicles, 336 M113A1 APC's, 48 M901 self-propelled TOW ATGM systems, 252 Dragon ATGM systems, 66 106.7-mm self-propelled mortars, 18 Improved Hawk surface to air missile systems, 36 Vulcan self-propelled antiaircraft mounts, 75 Stinger shoulder-fired surface to air missile systems (fire teams), 146 helicopters including 50 AH-64A Apache fire support helicopters, as well as around 5,000 motor vehicles and over 5,000 radios.

Footnotes

1. According to the latest foreign military press reports, the 203.2-mm self-propelled howitzers with support and service subunits have been removed from division artillery—Ed.

2. Personnel strength is proposed to be reduced to 16,000-17,000—Ed.

6904

American Agile Falcon Fighter Project

18010401p Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) p 76

[Article by Col I. Petrov]

[Text] The American firm of General Dynamics made a proposal to the U.S. Air Force command and U.S. NATO partners which have the F-16 Fighting Falcon fighters in the inventory to develop [razrabotat], test and begin series production of its modified version code-named "Agile Falcon." The firm's specialists believe that the new aircraft would be able to supplement the future American ATF fighter just as the F-16 fighter at one time supplemented the F-15.

The project of the Agile Falcon aircraft has been in the works by the firm for around three years now. It envisages an increase in wing area from 27.9 to 34.8 m^2 and an increase of 2.3 m in its span (see diagram [diagram not reproduced]). In addition, it is proposed to use a more powerful engine (13,000 kg class of thrust on afterburner) and improved electronics in the fighter. Unit load on the Agile Falcon wing will be around 332 kg/m^2, angular rate of turn will be 3 degrees/sec greater than for the F-16C, and length of the landing run will be

reduced 150 m. According to calculations, wing modification will lead to an increase in the fighter's weight by approximately 545 kg, but because of the use of composite materials it is planned to reduce this indicator by approximately half.

In the opinion of American specialists, European NATO countries—Belgium, Denmark, the Netherlands and Norway—participating in joint production of the F-16 aircraft together with the United States also could be brought into the Agile Falcon project. It is assumed that this aircraft would provide the air forces of those countries with a faster improvement in their combat capabilities and with lesser expenditures than procurement of the new French Rafale fighter or the European EFA being created [sozdavat] jointly by Great Britain, the FRG, Italy and Spain.

Implementation of the Agile Falcon project does not provide for an expansion in the existing program for procuring F-16 fighters for the U.S. Air Force. Judging from foreign press reports, long-range plans are designed for procuring an overall total of 2,737 F-16's, of which 1,859 already have been delivered or ordered. Of the remaining 878 F-16 fighters planned for production but not yet ordered, around 500 could be built in the Agile Falcon version. In addition, it is planned to produce 218 such fighters for European countries: 60 for Belgium, 44 for Denmark, 24 for Norway and 90 for the Netherlands. In the assessment of General Dynamics the cost of a series Agile Falcon aircraft will be approximately $2 million greater than the F-16C. Development [razrabotka] of the new aircraft could begin in 1990 and delivery could begin during 1994-1995.

The U.S. Air Force leadership has not yet made a specific decision on the Agile Falcon project. In responding to the firm's proposal on this matter, however, Secretary of the Air Force Aldridge stated that this project looks very tempting.

6904

Reorganization of Japan's Naval Districts

18010401q Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian
No 5, May 88 (signed to press 5 May 88) p 77

[Article by Capt 1st Rank F. Rubin]

[Text] In accordance with the plan for organizational development of the Japanese naval forces, a reorganization of certain formations of naval districts was conducted in 1987.* Logistic support services immediately subordinate to commandants of the naval districts and including a headquarters as well as five departments (finance, supply, personnel support, motor transport, facilities and construction) were established in each naval district (Yokosuka, Kure, Sasebo, Maizuru and Oominato). Those departments and subunits subordinate to them previously were part of naval bases. In addition, the separate Funakoshi (a district of the city of Yokosuka where naval headquarters is located) MTO [logistics] detachment was resubordinated from the corresponding naval base to the chief of the logistic service of the Yokosuka Naval District.

Roadstead services of the same name were disbanded in the Yokosuka, Sasebo and Maizuru naval districts and formations included in them transferred to the subordination of chiefs of the corresponding naval bases. The Tsurugi observation and communications post (Yokosuka Naval District) and the recruiting points of Naha and Kammon (the Naha and Shimonoseki PB [floating bases] respectively, Sasebo Naval District) also were disbanded. As a result of this reorganization, at the present time the following are subordinate to the chief of each of the five naval bases: headquarters, detachments of auxiliary vessels and coast guard, frogman group, and individual ships, small combatants and vessels. Some naval bases also have separate divisions [divizion] of motor patrol boats and motor torpedo boats (1st—Yokosuka Naval Base, 3d—Sasebo, 2d—Maizuru), observation and communications posts (Kannon [sic], Kogosaki and Bakuti; Yokosuka, Sasebo and Maizuru naval bases respectively), separate detachments (Saeki—Kure Naval Base, Amami—Sasebo Naval Base, Niigata—Maizuru Naval Base) and recruiting points (Tokuyama and Sakai; Kure and Maizuru naval bases respectively).

In addition, during the reorganization measures the frigate DE 223 "Yoshino" (from the 38th Division of the Kure Naval District) was resubordinated to the commander of the 31st Division of the Maizuru Naval District, and the frigate DE 211 "Isuzu" which was part of the latter is directly subordinate to Maizuru Naval District headquarters. The frigate "Mogami" was transferred to the reserve with reclassification as the training ship TV 3505 and transferred from the Maizuru Naval District to the 1st Division of the training ship squadron. The Sasebo Naval District was augmented by the new landing ship LCU 2001. The 43d Division of minesweepers (Shimonoseki Floating Base) was disbanded and the ships "Teuri" and "Murotsu" which were part of it were transferred to the reserve and reclassified as auxiliary vessels (YAS 87 and YAS 88 respectively). In its place the 11th Division of the 1st Minesweeper Flotilla was transferred to the chief of the Shimonoseki Floating Base. Other units of naval districts underwent no substantial changes.

Footnotes

*For more detail on naval districts and the plan for organizational development of the Japanese naval forces see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 5, 1987, pp 47-54; No 10, 1987, pp 69-71—Ed.

6904

American Pointer Drone

18010401r Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 5, May 88 (signed to press 5 May 88) pp 77-78

[Article by Lt Col V. Kuzmin]

[Text] The American firms of Bell and Boeing are developing [razrabatyvat] on an initiative basis a new drone with vertical take-off and landing, the D-340 Pointer (see diagram [diagram not reproduced]), which they plan to submit for a competition announced by the U.S. Navy for creating [sozdaniye] a ship-based reconnaissance drone. The firms' specialists assume that such a craft will be able to find use not only in the Navy, but also in the Army for conducting aerial reconnaissance, detecting and identifying targets, and for target designation at ranges up to 185 km. The principal advantages of the D-340 in comparison with other drones are considered to be the relatively low cost, possibility of employment from ships of small displacement, rapid deployment (no special equipment is required for supporting the take-off and landing) and relatively long flight endurance. The projected performance characteristics of the D-340 Pointer drone are given below.

Weight, kg:	
Estimated take-off	250
Payload	34
Fuel	45
Flight speed, km/hr:	
Maximum	300
Cruising	260
Cruising, loiter	130
Service ceiling, m	6,000
Hover ceiling not counting ground effect, m	2,300
Flight endurance at speed of 130 km/hr, hr	7
Loiter endurance at distance of 90 km and speed of 110 km/hr, hr	5
Flight endurance in hover mode at distance of 90 km and altitude of 900 m, hr	2.2
Radius of action, km	185
Fuselage length, m	3.7
Height, m	1.7
Wingspan, m	3.3

The D-340 craft has a modular design, high-set wing unswept in plan view, single-fin tail unit and ski-type undercarriage. A 95 hp piston engine is used as the power plant, accommodated in the central part of the fuselage. The engine rotates two three-bladed propellers, each 2.16 m in diameter. These propellers are tiltable and mounted on the wingtips (rotation rate 1,500 rpm). It is planned to use the GCS-2000 ground station, part of the equipment set of the Israeli Pioneer-1 drone, for controlling the drone's flight. The first flight of the D-340 Pointer prototype was planned for late 1987, and in 1988 it is planned to carry out its demonstration flights.

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